RPSC COLLEGE LIBRARIAN

COMPILED E-BOOK

PAPER 2 - ALL UNITS

BASED ON RPSC SYLLABUS PAPER 2

by
Saket Sharma

ABOUT SAKET SHARMA

Saket Sharma is a recent graduate with a Master's degree in Library and Information Science (MLIS) and a Bachelor's degree in the same field. He has a strong academic foundation further bolstered by clearing both the UGC NET and JRF exams. His professional experience includes an internship at The Energy and Research Institute where he worked on the Legal Depository for Solar Energy Project. He is proficient in various library management and institutional repository software, along with web source discovery systems. Additionally, he has co-authored an international conference paper and contributed a chapter to a book, showcasing his research and writing abilities.

Education:

- Master of Library and Information Science (MLIS), Delhi University SOL (2023)
- Bachelor of Library and Information Science (BLIS), Indira Gandhi National Open University (IGNOU) (2022)

Research Qualifications:

- University Grants Commission (UGC) NET (2022)
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Professional Experience:

- Internship at The Energy and Research Institute (TERI)
  - Legal Depository for Solar Energy Project (International Solar Alliance)

Technical Skills:

- Library Management Softwares: KOHA, Libsys, E-Granthalaya, SOUL
- Institutional Repository Softwares: DSpace, Greenstone, Microsoft SharePoint, E-Prints
- Web Source Discovery Systems

Publications:

- International Conference Paper:
  - Title: "Value of Artificial Intelligence in Developing Future Digital Libraries"
  - Co-authored with Dr. P.K. Bhattarcharya
  - Presented at Rishihood University
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PAPER 2 -UNIT 1

RPSC COLLEGE LIBRARIAN

Saket Sharma

Unit – I:

Sources, Services and Access of Information – Types, Evaluation and Use. Reference Sources and Web Resources – Encyclopedias. Dictionaries, Geographical Sources. Biographical Sources. Year-books/Almanacs, Directories and Handbooks. Statistical Sources – Features and evaluations. Bibliographical Sources-Bibliographies, Indexing and Abstracting Journals (Salient features and evaluation). E-documents, E-books, E-Journals. Databases – Bibliographic, Numeric and Full text- Evaluation, Subject Gateways/Portals, Databases, Bulletin Boards, Discussion Group/Forums.

Reference Services- Concept, Definition, Kinds and Trends, Reference service v/s Information service. Bibliographic Service, Indexing and Abstracting Service, CAS, SDI Service, Referral, Document delivery service. Translation Services, Reprographic Services. Online Service: Information products, Nature, types, and marketing.

Online Search Services and Technologies- Search Engines and Meta Search Engines. Internet Search Techniques. IOT (Internet of things). Introduction to Web Servers: Apache Server and Internet Information Server.

Sources, Services, and Access of Information – Types, Evaluation, and Use

Introduction

In the field of Library and Information Science, the management and dissemination of information are key aspects. This involves understanding the sources of information, the services provided to access this information, and the methods of evaluating and using the information.

Sources of Information

Information sources can be categorized into primary, secondary, and tertiary sources:

1. Primary Sources: These are original materials or raw data, such as research articles, patents, theses, and conference proceedings.
2. Secondary Sources: These are interpretations or evaluations of primary sources, such as review articles, bibliographies, and indexes.
3. Tertiary Sources: These compile or distill primary and secondary sources, such as encyclopedias, dictionaries, and handbooks.

Services for Accessing Information

Libraries provide various services to facilitate access to information:

1. Reference Services: Librarians assist users in finding information and using library resources.
2. Circulation Services: This involves the lending of library materials to users.
3. Interlibrary Loan: Libraries cooperate to share resources, allowing users to access materials from other libraries.
4. Electronic Services: Many libraries provide online access to their collections, databases, and other digital resources.

Evaluation of Information

Evaluating the quality and relevance of information is crucial. This can involve:

- Authority: Checking the author's credentials and the reputation of the publisher.
- Accuracy: Verifying the information with multiple sources.
- Currency: Checking the timeliness of the information.
- Relevance: Determining whether the information meets the user's needs.

Characteristics of Information

Characteristics of Information:

a. Timeliness: Receiving breaking news updates as events unfold.
b. Accuracy: Ensuring medical information provided is based on verified research.
c. Relevance: Obtaining data on local weather conditions for planning outdoor activities.
d. Adequacy: Finding enough details in a user manual to assemble furniture correctly.
e. Completeness: Accessing all necessary documents for a comprehensive financial audit.
f. Explicitness: Following step-by-step instructions for troubleshooting a computer issue.
g. Impartiality: Reading a scientific report that presents findings without bias.
h. Worth its cost: Subscribing to a reputable financial database for accurate stock market information.

Types of Information Needs

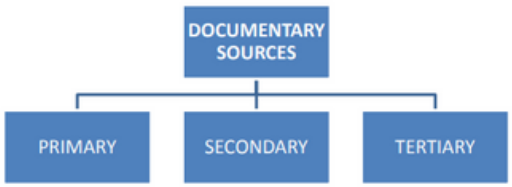
1. News: Current events like the latest developments in politics or the economy.
2. Ideas and Opinions: Seeking diverse perspectives on a controversial topic for a debate.
3. Research Results: Accessing a scientific study's findings on climate change impacts.
4. Routine Information: Checking weather forecasts before planning an outdoor event.
5. History or Background Information: Learning about the origins of a cultural tradition.
6. Facts and Figures: Finding statistics on global population growth for a presentation.
7. Technical Information: Understanding the specifications of a new software update.
8. Legal Information: Consulting a lawyer for clarification on a specific clause in a contract.

Types of Information Sources

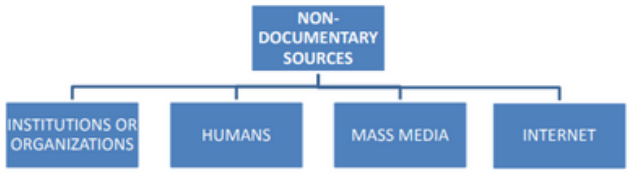
During user-requirements analysis, identifying information sources is crucial for obtaining comprehensive and accurate data. These sources are categorized into documentary and non-documentary sources.

1. Documentary sources encompass published or unpublished materials, organized as primary, secondary, and tertiary sources based on the appearance of information.
2. Non-documentary sources include formal and informal channels that do not rely on documented content.

Types of Documentary Sources



Types of Non- Documentary Sources



Examples of Information Sources in Library and Information Science:

Documentary Sources:

1. Primary Sources: Original manuscripts, diaries, letters, or photographs.
2. Secondary Sources: Books, articles, or reviews that analyze or interpret primary sources.
3. Tertiary Sources: Encyclopedias, dictionaries, or textbooks that compile and summarize information from primary and secondary sources.

Non-Documentary Sources:

1. Formal Sources: Experts, librarians, or information professionals who provide guidance or assistance in locating information.
2. Informal Sources: Conversations, discussions, or personal experiences shared by peers or colleagues, which may offer valuable insights or recommendations.

Reference Sources and Web Resources in Library and Information Science:

1. Encyclopedias:

- **Definition:** General or subject-specific reference works providing concise overviews of various topics.
- **Examples:**
  - General: Britannica, Wikipedia (use with caution due to potential bias)
  - Subject-specific: Oxford Encyclopedia of Digital Music, International Encyclopedia of the Social & Behavioral Sciences
- **Benefits:** Quick overviews, broad range of topics, entry points for further research.
- **Limitations:** May lack depth, potential for bias, accuracy varies depending on source.

2. Dictionaries:

- **Definition:** Reference works listing words and their definitions, pronunciation, usage, etc.
- **Examples:** Merriam-Webster Dictionary, Oxford English Dictionary, subject-specific dictionaries (e.g., medical dictionary).
- **Benefits:** Clarifying meaning, spelling, pronunciation, finding synonyms and antonyms.
- **Limitations:** Limited scope, may not cover slang or specialized terminology.

3. Geographical Sources:

- **Definition:** Reference works providing information about places, their features, populations, etc.
- **Examples:** Atlases (e.g., National Geographic Atlas), Gazetteers (e.g., World Gazetteer), Geographic Information Systems (GIS).
- **Benefits:** Understanding locations, finding physical features, demographic data.
- **Limitations:** May not cover historical information or smaller locations.

4. Biographical Sources:

- **Definition:** Reference works providing information about individuals' lives, works, and achievements.
- **Examples:** Who's Who, National Biography, online biographical databases.
- **Benefits:** Learning about influential figures, finding factual information about individuals.
- **Limitations:** May not cover lesser-known individuals, potential for bias.

5. Yearbooks/Almanacs:

- **Definition:** Annual publications summarizing events, statistics, and other factual information for the previous year.
- **Examples:** World Almanac and Book of Facts, Guinness World Records, Statesman's Yearbook.
- **Benefits:** Finding up-to-date statistics, factual information, and historical summaries.
- **Limitations:** Time-bound, may not cover specific niche topics.

6. Directories and Handbooks:

- **Definition:** Reference works listing organizations, individuals, resources, or information on a specific topic.
- **Examples:** Telephone directories, business directories, subject-specific handbooks (e.g., engineering handbook).
- **Benefits:** Finding contact information, resources on specific topics, locating organizations or individuals.
- **Limitations:** May not be exhaustive, may require paid access for some directories.

Statistical Sources: Features and Evaluations

Statistical sources are invaluable tools for research and analysis across various fields. They provide quantitative data and insights into trends, patterns, and relationships. Here's a breakdown of their features and evaluation considerations:

Types of Statistical Sources:

- **Government Data:** National censuses, economic reports, crime statistics (e.g., U.S. Census Bureau, World Bank)
- **Academic Publications:** Journal articles, research reports, dissertations (e.g., Google Scholar, JSTOR)
- **International Organizations:** Reports from UN, World Health Organization, etc.
- **Market Research Firms:** Reports on consumer behavior, industry trends (e.g., Nielsen, Statista)
- **Non-profit Organizations:** Data on social issues, environmental indicators (e.g., Pew Research Center, World Wildlife Fund)

Features:

- Comprehensiveness: Scope and coverage of data (e.g., national vs. regional, specific vs. general topics)
- Timeliness: Frequency of data updates, availability of historical data

- **Accuracy:** Methodology used to collect and analyze data, potential for bias or errors
- **Accessibility:** Ease of access and use, format (e.g., tables, charts, raw data)
- **Cost:** Free vs. subscription-based resources

Evaluation:

- **Validity:** Does the data measure what it purports to measure?
- **Reliability:** Is the data consistent and reproducible?
- **Representativeness:** Does the data accurately represent the population or phenomenon under study?
- **Currency:** Is the data up-to-date and relevant to your research question?
- **Transparency:** Is the methodology clearly explained and accessible?
- **Source Credibility:** Reputation and expertise of the organization collecting and publishing the data

Additional Considerations:

- **Sampling:** Understand the sampling method used and its potential impact on generalizability.
- **Metadata:** Utilize metadata for context and understanding how the data was collected and analyzed.
- **Ethical Considerations:** Be mindful of privacy and confidentiality concerns associated with the data.

Bibliographical Sources: Bibliographies, Indexing, and Abstracting Journals

Bibliographical sources play a crucial role in navigating the vast ocean of information. Here's a breakdown of their key features and evaluation considerations:

1. Bibliographies:

- **Definition:** Lists of publications on a specific topic, often arranged alphabetically or chronologically.
- **Types:** Subject bibliographies, national bibliographies, author bibliographies.
- **Salient features:** Comprehensiveness, currency, organization, annotation (descriptive summaries).
- **Evaluation:** Scope and relevance to your research, accuracy of citations, quality of annotations (if present).
- **Examples:** MLA Handbook, ERIC, Science Citation Index.

2. Indexing Journals:

- **Definition:** Periodicals listing citations and keywords from articles in other journals or publications.
- **Types:** Subject-specific, general, citation indexes.
- **Salient features:** Subject coverage, time coverage, indexing depth (keywords vs. controlled vocabulary), currency of updates.
- **Evaluation:** Relevance to your research field, depth and accuracy of indexing, ease of use and navigation.
- **Examples:** Chemical Abstracts, Web of Science, PubMed.

3. Abstracting Journals:

- **Definition:** Periodicals providing summaries of articles from other publications, allowing users to decide whether to read the full text.
- **Types:** Subject-specific, general, informative vs. indicative abstracts (summarizing key points vs. just mentioning topics).
- **Salient features:** Coverage, currency, abstract length and quality, subject indexing.
- **Evaluation:** Relevance to your research field, accuracy and completeness of abstracts, ease of use.
- **Examples:** Biological Abstracts, Psychological Abstracts, Science Citation Index Expanded.

Additional notes:

- **Online vs. print:** Many bibliographical sources are now available online, offering advanced search capabilities and wider access.
- **Subject expertise:** Consider using subject-specific resources for more targeted and in-depth information.
- **Critical evaluation:** Remember that no single source is perfect. Always evaluate the credibility and authority of the source before using its information.

By understanding the features and evaluating them based on your specific needs, you can leverage bibliographical sources effectively to find relevant and reliable information for your research and studies.

E-documents, E-books, E-journals: Features and Applications

The digital world has revolutionized access to information through electronic documents (e-documents), e-books, and e-journals. Here's a breakdown of their features and applications:

1. E-Documents:

- **Definition:** Digital versions of physical documents like reports, articles, presentations, etc.
- **Formats:** PDF, DOC, HTML, XML.
- **Features:** Accessibility, searchability, portability, potential for multimedia integration.
- **Applications:** Sharing information, collaboration, document management, archiving, online publications.
- **Examples:** Research reports, white papers, government documents, e-learning materials.

2. E-books:

- **Definition:** Digital versions of traditional books, available on dedicated devices or computer applications.
- **Formats:** EPUB, MOBI, PDF.
- **Features:** Textual and multimedia content, customizable reading experience (font, size, etc.), portability, searchability, integration with online libraries.
- **Applications:** Reading for pleasure, education, research, professional development.
- **Examples:** Novels, textbooks, academic monographs, biographies, children's books.

3. E-journals:

- **Definition:** Electronic versions of academic journals, offering access to peer-reviewed articles and research findings.
- **Platforms:** Dedicated databases (e.g., JSTOR), publisher websites, subscription services.
- **Features:** Full-text access, advanced search capabilities, citation tracking, access to current and historical issues, often integrated with university libraries.
- **Applications:** Academic research, scholarly communication, staying updated on current research, finding relevant studies for specific topics.
- **Examples:** Science, Nature, The Lancet, Journal of the American Medical Association, IEEE Transactions.

Additional notes:

- E-documents, e-books, and e-journals offer several advantages over their physical counterparts, including accessibility, affordability, and environmental sustainability.
- However, it's crucial to consider factors like copyright, licensing, and information credibility when using these resources.

Comparison

Feature	E-documents	E-books	E-journals
Content type	Diverse	Primarily textual	Primarily scholarly articles
Target audience	General	General and specific audiences	Researchers and academics
Focus	Information sharing, collaboration	Reading, learning	Research and knowledge dissemination
Access	Varies, often open-access	Varies, often subscription-based	Typically subscription-based

Evaluating Bibliographic, Numeric, and Full-Text Databases:

Bibliographic Databases:

Evaluation Criteria:

- **Scope and Coverage:** Does the database cover the relevant fields, subfields, and time periods for your research?
- **Indexing and Search Capabilities:** Are the search options advanced and diverse enough for your needs (e.g., subject keywords, author names, title words, publication date)?
- **Currency:** How often is the database updated with new entries?
- **Accuracy and Credibility:** Are the citations and references reliable and well-sourced?
- **Data Format:** Does the database provide abstracts, summaries, or other additional information besides citations?
- **Cost:** Is the database free or subscription-based, and is it accessible through your institution or personal subscription?
- **User Interface:** Is the interface intuitive and user-friendly, allowing for easy navigation and search refinement?

Examples:

- PubMed (medical and life sciences)
- ERIC (education)
- ScienceDirect (science and technology)
- Library of Congress Online Catalog (general)

Numeric Databases:

Evaluation Criteria:

- **Scope and Coverage:** Does the database cover the relevant data sets and variables for your research question?
- **Data Quality:** Are the data accurate, reliable, and free from errors?
- **Timeliness and Currency:** How often is the data updated?
- **Data Format:** Is the data available in formats compatible with your analysis tools (e.g., CSV, Excel)?
- **Documentation and Metadata:** Does the database provide clear documentation and metadata explaining the data collection methods, variables, and limitations?
- **Cost:** Is the database free or subscription-based, and is it accessible through your institution or personal subscription?
- **User Interface:** Can you easily filter, sort, and download the data you need?

Examples:

- World Bank Open Data
- Statista
- OECD iLibrary
- U.S. Census Bureau

Full-Text Databases:

Evaluation Criteria:

- **Scope and Coverage:** Does the database cover the relevant journals, publications, and document types for your research?
- **Full-Text Availability:** Does the database offer full-text access to the majority of its resources, or does it primarily provide citations and abstracts?
- **Search Capabilities:** Are the search options advanced and diverse enough to find specific articles or sections within documents?
- **Currency:** How often is the database updated with new full-text content?
- **Copyright and Access:** Are the resources available through your institution or personal subscription, and are there any copyright restrictions on using the content?
- **User Interface:** Can you easily navigate and search the database, and is there functionality to export or save articles?

Examples:

- JSTOR
- ProQuest
- EBSCOhost
- ScienceDirect

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Subject Gateways/Portals, Databases, Bulletin Boards, Discussion Group/Forums

1. Subject Gateways/Portals:

- **Definition:** Organized collections of web links and resources on specific topics, curated by librarians or information professionals.
- **Example:** The National Cancer Institute's Gateway to Cancer Information provides access to reliable cancer resources for patients, families, and healthcare professionals.
- **Benefits:** Facilitate discovery of relevant information, improve search efficiency, ensure quality of resources.

2. Databases:

- **Definition:** Structured collections of digital information organized for efficient searching and retrieval.
- **Example:** EBSCOhost, ProQuest, and ScienceDirect are academic databases containing scholarly articles, journals, and other publications.
- **Benefits:** Provide comprehensive access to specific information domains, enable advanced search functionalities, allow data analysis.

3. Bulletin Boards:

- **Definition:** Online forums where users can post messages and replies on specific topics.
- **Example:** The American Library Association's LIS-forum is a bulletin board for librarians and information professionals to discuss professional topics.
- **Benefits:** Facilitate asynchronous communication and information exchange within a community, support collaboration and knowledge sharing.

4. Discussion Groups/Forums:

- **Definition:** Online platforms for real-time conversations and discussions on specific topics.
- **Example:** The Library Juice Academy forums provide spaces for librarians to ask questions, share experiences, and learn from each other in real-time.
- **Benefits:** Enable synchronous communication, foster debate and critical thinking, build communities around shared interests.

Additional Notes:

- These resources can be used for various purposes in library and information science, including research, teaching, learning, and professional development.
- The choice of resource depends on the specific information needs and the desired level of interaction.
- Ethical considerations are important when using online resources, such as respecting copyright and ensuring the accuracy and credibility of information.

Examples

- **Subject Gateway:** INFLIBNET's InfoPort offers a gateway to Indian scholarly resources, potentially including some related to Ghaziabad or Uttar Pradesh.
- **Database:** The National Informatics Centre (NIC) databases might contain information specific to Ghaziabad or Uttar Pradesh, such as government reports or statistical data.
- **Bulletin Board:** Local library associations or professional groups in Ghaziabad or Uttar Pradesh might have online forums for discussion and information exchange.
- **Discussion Group:** Social media platforms like Facebook might have groups dedicated to specific topics related to Ghaziabad or Uttar Pradesh, where discussions can take place.

Reference Services- Concept, Definition, Kinds and Trends

The ALA Glossary of Library and Information Science provides a functional definition of reference sources as "A book designed by the arrangement and treatment of its subject matter to be consulted for definitive items of information rather than to be read consecutively."

Dictionary

- Book containing words arranged alphabetically with meanings.
- Includes pronunciations, grammatical labels, illustrative quotations, synonyms, antonyms, usage notes, etymology, and more.
- Ancient Greeks and Romans pioneered dictionary production, focusing on rare or specialized words.

Thesaurus

- Groups words with similar meanings (synonyms) together.
- Helps find the most appropriate word to express an idea, along with related words.
- Roget's Thesaurus, developed by Dr. Peter Mark Roget in 1852, is widely used.
- Latest edition, Roget's II: The New Thesaurus, 3rd Edition, available online with 260,000 synonyms and cross-references.

Glossary

- Compendium of specialized terms with explanations.
- Provides clarity on specific subjects or industries.

Uses of Dictionaries Based on the number of words, scope and coverage of other items of information, the dictionaries can be categorized into four following groups:

1. **General Language Dictionaries**
2. **Subject Dictionaries**
3. **Special Dictionaries**
4. **Bilingual and Multilingual Dictionaries**

General Language Dictionaries

a. Comprehensive/Unabridged:

- Covers all words of a language, including past and current usage.
- Example: Merriam-Webster's Third New International Dictionary of the English Language (over 450,000 entries).
- Online version: Merriam-Webster Unabridged-Online Dictionary.

b. Pocket Dictionary:

- Small enough for easy portability.
- Contains 40,000 to 60,000 words currently in use.
- Example: Merriam-Webster's Pocket Dictionary (40,000 entries).

Subject Dictionaries

a. Definition:

- Focuses on terms within a specific subject area.
- Reflects growing study and research across various fields.

b. Example:

- McGraw-Hill Dictionary of Scientific and Technical Terms, 6th edition.
- Comprehensive coverage of over 115,000 terms and 125,000 definitions in 104 areas of science and technology.

Special Dictionaries

- Cambridge English Pronouncing Dictionary: Provides detailed British and American pronunciation for each word, available in both print and mobile formats.
- Cambridge Idioms Dictionary: Explains the meanings and usage of over 7,000 idiomatic expressions in British, American, and Australian English.

Bilingual and Multilingual Dictionaries

a. **Bilingual Dictionaries**:

- Translate words from one language to another.
- Example: Concise Oxford Spanish Dictionary, 4th edition.
  - Comprehensive English-Spanish and Spanish-English dictionary with 175,000 words and phrases, and over 200,000 translations.
  - Online edition available from Oxford University Press.

b. **Multilingual Dictionaries**:

- Translate words into more than two languages.
- Also known as translating dictionaries.
- Generally limited to specific subject fields.
- Example: Multilingual Biomedical Technical Dictionary.
  - Covers over 40,000 entries with about 40,000 synonyms in seven languages.

Types of Encyclopedias

a. **General Encyclopedias**:

- Cover all fields of knowledge.
- Example: Encyclopedia Britannica.

b. **Subject Encyclopedias**:

- Focus on single subjects or groups of subjects.
- Examples: Encyclopedia of Physics, Encyclopedia of Science and Technology.

General Encyclopedias Categories:

- **Size**: Single volume-set or multivolume-set.
- **Target Users**: For adults, students, or children.

Examples of Encyclopedias:

- **Encyclopedia Britannica**:
  - General English language encyclopedia.
  - Contains 73,645 articles.
  - Aimed at educated adults.
  - Comprises:
    - 12-Volume Micropedia (short articles).
    - 17-Volume Macropedia (long articles).
    - One-Volume Propedia (outline of knowledge).
    - 2-Volume Index.

Variants of Britannica Encyclopedia

a. **Single Volume Britannica Concise Encyclopedia**:

- Condenses larger 32-Volume Britannica.
- Contains 28,000 short articles.

b. **Britannica Student Encyclopedia**:

- Consists of 16 volumes.
- Includes over 2,300 articles with 3,300 photos, illustrations, charts, and tables.
- Contains 1,000 maps and flags.

Encyclopedia Britannica Online:

- Contains text of 32-volume Britannica plus additional articles and images.
- Over 120,000 articles.
- Features natural language searching and A-Z browsing.
- Continually updated with daily features, updates, and links to news reports from The New York Times and the BBC.
- Subscription options available for schools, colleges, libraries.
- Website: Britannica

Subject Encyclopedias

b. **Definition**:

- Provides detailed information on specific areas of knowledge.
- Range from broad subjects to narrow fields.
- Available in multivolume or single-volume formats.

Examples of Subject Encyclopedias:

- **McGraw Hill Encyclopedia of Science and Technology, 11th edition**:
  - 20-volume set focused on scientific and technical subjects.
  - Covers life sciences, physical sciences, engineering, and technology.
  - Access Science website offers online access, including illustrations and animations.
  - Updated daily.
  - Website: Access Science
- **McGraw Hill Concise Encyclopedia of Science and Technology**:
  - One-volume set based on the full edition.
  - Latest version: 6th edition published in 2009.
  - Website: McGraw Hill Professional
- **Encyclopedia of Library and Information Science**:
  - 35-volume set edited by Allen Kent, published by Marcel Dekker.
  - Provides tools and techniques for librarians, information/computer scientists, and students.
  - Articles written by over 1300 subject experts.
  - Regular supplements cover new trends and advances.
  - 36 supplement volumes published so far (Volume- 36 to Volume- 72).

Yearbooks

a. International Yearbook:

- Provides statistical information about every country worldwide.
- Example: The Statesman's Yearbook 2014 by Macmillan.
  - Includes political, economic, and social accounts of 194 countries.
  - Online version offers additional features like monthly updates and economic overviews.
  - Website: Statesman's Yearbook

b. National Yearbook:

- Offers up-to-date information on a specific country's political, economic, and social aspects.
- Example: India 2011: A Reference Annual, 55th edition.
  - Published by Publication Division, Ministry of Information and Broadcasting, Government of India.
  - Covers various subjects related to India like economy, development, culture, defense, etc.
  - Website: Publication Division

c. Subject Yearbook:

- Devoted to specific subjects or groups of subjects.
- Example: McGraw-Hill Year Book of Science & Technology- 2014.

Almanac

a. Definition:

- Reference book published annually.
- Originally provided calendars with astronomical data.
- Present-day almanacs offer comprehensive statistical and descriptive data on various topics.

Examples of Almanacs:

- World Almanac and Book of Facts 2014:
  - Published annually in the USA by Barnes & Noble.
  - Covers a wide range of topics including geography, government, economics, health, sports, etc.

Whitaker's Almanack 2014:

- Published annually in the UK by A&C Black Publishers.
- Provides statistical and descriptive data on various subjects.
- Website: Whitaker's Almanack

Handbook

a. **Definition**:

- Derived from the German word 'Handbuch', meaning a small book with useful facts.
- Concise reference book providing specific information or instruction about a topic.
- Designed for quick consultation and providing quick answers.

Examples of Handbooks:

- **CRC Press**:
  - Publishes numerous handbooks for practitioners.
  - Examples include Handbook of Chemistry and Physics, Handbook of Lipid Bilayers.
  - Website: CRC Press

Manual

b. **Definition**:

- Derived from the Latin term 'manualis', meaning a guidebook.
- Provides step-by-step instructions on how to perform a specific task or operate a machine.

Examples of Manuals:

- **Home Appliances Manuals**:
  - Provided with appliances like televisions, air conditioners, ovens, mobile phones, etc.
  - Offers instructions on how to use the appliance effectively.
- **Cookbooks**:
  - Provide step-by-step instructions for preparing recipes.
- **Assembly Manuals**:
  - Provide instructions for assembling products like computers.

Directory

a. Definition:

- A list of names and addresses of people and organizations.
- Important reference tool in libraries for directory-type inquiries.

Categories of Directories:

- General Directories:
  - Example: Telephone directory.
  - Provides telephone numbers and addresses of subscribers.
  - Compiled by post and telegraph departments.
- Special Directories:
  - Include directories of organizations.
  - Broadly grouped into:
    i. Directories of academic and research institutions.
    ii. Professionals Directories.
    iii. Trade and business directories.

Examples of Special Directories:

- Directories of Academic and Research Institutions:
  - Example: The Europa World of Learning 2013, 63rd edition.
    - International directory covering 33,000 academic institutions worldwide.
    - Available in print and online.
    - Website: Routledge

- Universities Handbook:
  - 32nd edition published by Association of Indian Universities (AIU).
  - National directory listing 341 university-level institutions in India.
  - Provides information on courses, facilities, faculty, etc.
- Professionals Directories:
  - Compiled by learned societies and associations.
  - Example: The University of Adelaide Professional Directory.
- Trade and Business Directories:
  - Example: Kothari Industrial Directory of India, 40th edition, 1996.
  - Provides information about trade, business, and industries.

Geographical Information Sources

a. **Definition**:

- Include maps, atlases, globes, gazetteers, and guidebooks.
- Provide information about places, people, rivers, mountains, forests, lakes, etc.
- Maintained in library reference collections to meet users' information needs.

Types of Geographical Information Sources:

- **Maps, Atlases, and Globes**:
  - Provide visual representations of geographical features.
- **Gazetteers**:
  - Provide detailed geographical information about places, including names, locations, and characteristics.
- **Guide Books**:
  - Offer information and guidance for travelers, including details about attractions, accommodations, and activities.

Maps, Atlases, and Globes

a. Definition:

- Maps: Pictorial presentations of the earth's surface, showing countries, cities, rivers, lakes, and mountains. Can also depict the sky's celestial bodies.
- Types of Maps: General Reference Maps and Thematic Maps.

Types of Maps:

- General Reference Maps:
  - Identify and locate various geographic features, including land features, water boundaries, political boundaries, cities, and towns.
  - Include:
    - Political Maps: Depict boundaries of countries, states, continents, and other political units.
    - Physical Maps: Show physical features such as mountains, rivers, and lakes.
    - Road Maps, Street Maps, and Charts: Aid navigation on land, water, or in the air. Road maps display different road categories, while street maps provide detailed views of smaller areas. Charts assist in navigating ships or airplanes.
- Thematic Maps:
  - Show the distribution of specific features like population, rainfall, or natural resources.
  - Represent quantities using symbols or color.

Atlas:

- A book containing a collection of maps.
- A comprehensive atlas includes maps of every country.

Globe:

- A map printed or pasted on a hollow sphere.
- Provides an accurate representation of the earth's surface, including proportions and positions of land features and oceans.

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National Maps and Atlases

- **Reliability**:
  - Depends on editorial staff and cartographers' expertise.
  - Countries have their own cartographic survey agencies.
- **Survey of India, Dehradun**:
  - National Principal Mapping Agency in India.
  - Responsible for mapping and producing geophysical maps and aeronautical charts.
- **National Atlas and Thematic Mapping Organization of India (NATMO), Kolkata**:
  - Prepares National Atlas of India, Thematic maps, and Digital maps.
- **National Atlas of India**:
  - First published in 1957 by NATMO.
  - Revised edition with 300 multi-color plates.
  - Covers physical and socio-cultural aspects of the country.
  - Available for sale in 8 volumes.
  - Website: NATMO

International Maps and Atlases

- **The Times Comprehensive Atlas of the World, 13th edition (2011)**:
  - Most comprehensive atlas with an index of over 200,000 place names.
  - Includes contributions from experts on key global issues.
  - Features maps, photographs, and graphics illustrating the physical world and human interaction.
- **Other Titles by the Publisher**:
  - The Times Concise Atlas of the World.
  - The Times Atlas of the World Desktop Edition.
  - The Times Atlas of the World Mini Edition.

Gazetteers

- **Definition**:
  - A dictionary of geographical names.
  - Lists names of places, seas, mountains, etc., along with historical and geographical details.
- **Types Based on Coverage**:
  - **International Gazetteer**:
    - Example: Merriam Webster's Geographical Dictionary, 32nd edition.
    - Contains 54,000 entries and 250 detailed maps.
  - **National Gazetteer**:
    - Example: Gazetteer of India -The Indian Union, New Delhi: Publication Division, 1965-78.
    - Consists of 4 volumes covering various aspects like country, history, economy, and administration.
  - **Local Gazetteer**:
    - Example: Haryana District Gazetteer edited by Singh, Raghbir & Ranga, Jeet Ram.
    - Focuses on specific districts, providing detailed information about local areas.

Guide Books

- **Definition**:
  - Travel guides or tourist guides providing information for travelers.
- **Purpose**:
  - Guide travelers on when to visit, how to reach, where to stay, what to see, and what to buy.
  - Include details on historical sites, museums, parks, routes, travel facilities, accommodations, restaurants, shopping, etc.
  - Provide maps, illustrations, and distances for convenience.
  - Offer information on visa, money exchange, weather, etc., especially for foreign visitors.
-

- **Types**:
  - **Regional, National, or City Guides**:
    - Cover specific regions, countries, or cities.
- **Sources**:
  - **Government Tourism Departments**:
    - Many countries' tourism departments publish guides to promote tourism.
    - Examples: Ministry of Tourism, India; State Tourism Departments in India.
  - **Printed Guides**:
    - Famous examples include Fodor’s guides, offering information on numerous destinations worldwide.
- **Online Resources**:
  - Websites launched by tourism departments and ministries:
    - Example: Incredible India, Delhi Tourism

Biographical Information Sources

- **Definition**:
  - Accounts of a person's life, usually written by others and published or intended for publication.
- **Types**:
  - **Individual Biographies**:
    - Cover the lives of specific individuals.
  - **Collective Biographies**:
    - Cover groups of people, also known as "Biographical Dictionaries".
- **Scope**:
  - **General Biographical Sources**:
    - Cover famous individuals from various fields worldwide.
    - Examples include "Who's Who in the World".
  - **Subject/Special Biographical Sources**:
    - Focus on individuals within a specific discipline or criteria.
    - Examples include "Who's Who in India".
- **Content**:
  - **Brief and Detailed Entries**:
    - Range from brief factual data to detailed essay-style biographies.
- **Living and Deceased Individuals**:
  - Some sources cover only living individuals (e.g., "Who's Who").
  - Others cover both living and deceased individuals (e.g., "Who was Who").
- **Examples**:
  - **International**:
    - Who's Who in the World: Provides biographies of noteworthy global figures.
      - Available online at Marquis' Who's Who.
  - **National**:
    - India Who's Who: Contains concise biographies of prominent Indians from various fields.
      - Published by INFA Publications.
    - National Portal of India - Who's Who Section: Provides information about individuals holding high offices in India.
      - Available at National Portal of India

Bibliography Overview

- **Definition**:
  - A compilation of documents sharing a common factor, such as subject, language, period, author, or other criteria.
- **Types**:
  - **National Bibliography**:
    - Lists publications produced within a specific country.
    - Aids in book selection and cataloging.
  - **Trade Bibliography**:
    - Compiled by publishers, booksellers, distributors, and printers.
    - Lists books available for sale, aiding librarians in book selection.
  - **Subject Bibliography**:
    - Lists documents on a particular subject.
    - Meets the information needs of users seeking materials on specific topics.
- **Purpose**:
  - **Book Selection**:
    - Helps librarians and researchers identify relevant publications.
  - **Information Retrieval**:
    - Facilitates access to materials on specific subjects or themes.
- **Examples**:
  - National Bibliography:
    - Lists publications produced within a country, aiding in book selection and cataloging.
  - Trade Bibliography:
    - Compiled by industry stakeholders, providing a list of books available for sale.
  - Subject Bibliography:
    - Focuses on documents related to a specific subject, catering to users' information needs.

Indexing and Abstracting Periodicals

- **Definition**:
  - Secondary periodicals that compile recently published literature from various primary sources in specific subject disciplines.
- **Purpose**:
  - Scan primary sources like research reports, conference proceedings, patents, etc., selecting relevant items.
  - Provide researchers with organized access to recent literature.
  - Offer bibliographical details and often abstracts, aiding in document identification and decision-making regarding reading.
- **Types**:
  - **Indexing Periodicals**:
    - Lists items with full bibliographical details but without abstracts.
  - **Abstracting Periodicals**:
    - Includes abstracts along with bibliographical details for listed items.
- **Benefits**:
  - Overcome language barriers by offering access to literature in various languages.
  - Keep researchers updated on current developments in their fields.
  - Assist in solving research problems.
- **Formats**:
  - Available in machine-readable formats like CD-ROMs and online databases.
  - Accessible through subscription-based services or free platforms like PubMed.

- **Examples**:
  - PubMed:
    - Free online database providing access to biomedical literature.
  - CAS Databases (Chemical Abstracts Service):
    - Subscription-based service offering comprehensive coverage of chemical literature.

Databases

- **Definition**:
  - Organized collections of data or information stored in computer-readable form, allowing easy access, modification, and updates.
- **Types**:
  - **Bibliographic Databases**:
    - Organized collection of bibliographic records referencing published literature like journal articles, conference proceedings, books, etc.
    - Can be general or subject-specific.
  - **Factual Databases**:
    - Collection of complete facts and data from specialized subject areas for analysis and application.
  - **Full Text Databases**:
    - Contains complete text of various sources like books, journals, magazines, newspapers, etc.
- **Examples**:
  - **MEDLINE**:
    - Premier bibliographic database of the U.S. Library of Medicine.
    - Contains over 19 million references to journal articles in medicine and allied disciplines.
    - Updated daily with thousands of new citations.
    - Provided free access via PubMed, linking to full-text articles when available.
  - **CAS (Chemical Abstracts Service) Databases**:
    - **CAplus**:
      - Subscription-based bibliographic database.
      - Provides abstracts of articles from 10,000 journals in chemical sciences and related fields.
      - Contains over 38 million records.
    - **CAS Registry**:
      - Factual database containing chemical substance information.
      - Includes details like chemical structure, names, properties, etc., for over 83 million substances.
    - **CASREACT**:
      - Factual database displaying chemical reactions.
      - Covers more than 70.7 million reactions.
- **Access**:
  - Available through specific platforms or websites, often with subscription requirements for premium features.
  - Examples include the National Library of Medicine website for MEDLINE and the CAS website for CAS databases.

CAS, SDI Service, Referral, Document delivery service

These terms all represent different services offered in libraries and information centers, aimed at helping users access and manage information effectively. Here's a breakdown of each:

1. Current Awareness Service (CAS):

- **Definition:** Regularly informing users about new information relevant to their specific interests.
- **Features:** Tailored to individual needs, based on profiles or keywords submitted by users. Can involve various formats like email alerts, RSS feeds, or printed updates.
- **Applications:** Staying up-to-date on industry trends, research developments, or news in specific fields. Ideal for professionals, researchers, and anyone wanting to stay informed.
- **Examples:** Research alerts from databases, custom news feeds, topic-specific email newsletters.

2. Selective Dissemination of Information (SDI):

- **Definition:** Similar to CAS, but often more automated and focused on searching specific databases for new content matching user profiles.
- **Features:** Utilizes search algorithms and keyword matching to identify relevant articles, reports, or other resources. Delivers results automatically to users based on predefined schedules.
- **Applications:** In-depth research projects, ongoing monitoring of specific topics, staying current with academic literature.
- **Examples:** Alerts from academic databases like PubMed or ScienceDirect, personalized news aggregators with keyword filters.

3. Referral Service:

- **Definition:** Directing users to other information professionals or organizations that can better meet their specific needs.
- **Features:** Requires knowledge of various information resources and community services. Often involves assessing user needs and identifying appropriate referrals.
- **Applications:** When a library's resources cannot fulfill a specific request, connecting users with specialists, government agencies, or community support services.
- **Examples:** Directing users to legal aid services, social service organizations, specialized libraries with unique collections.

4. Document Delivery Service:

- **Definition:** Obtaining copies of physical or digital documents that are not available locally.
- **Features:** May involve interlibrary loan agreements, accessing digital repositories, or using document scanning services. Often requires payment for copyright fees or delivery charges.
- **Applications:** Accessing materials for research projects, obtaining rare or out-of-print items, acquiring documents from other libraries or archives.
- **Examples:** Interlibrary loan requests, document scanning and delivery services, online repositories with downloadable resources.

Remember:

- These services often complement each other. For example, a librarian might use CAS to inform you about new research, then offer SDI within a specific database to narrow down relevant articles, and finally, provide referrals or document delivery for resources not available locally.
- The availability and specific features of these services may vary depending on the library or information center you use.

Service	Focus	User Involvement	Benefits
CAS	Broad awareness	User defines general topics	Saves time, stays updated
SDI	Personalized updates	User defines specific keywords	Highly relevant information, reduces overload
Referral	Connects to experts	User describes information need	Access to specialized knowledge, saves time
Document Delivery	Access to specific materials	User specifies document details	Overcomes geographical limitations

Translation Services vs. Reprographic Services

While both involve information, **Translation Services** and **Reprographic Services** cater to entirely different needs and processes:

Translation Services:

- **Definition:** Transforming written or spoken content from one language to another while preserving its meaning and context.
- **Services:** Translate documents, websites, software, marketing materials, legal documents, etc.
- **Features:**
  - Expertise in specific language pairs and subject areas.
  - Understanding of cultural nuances and terminology.
  - Use of translation tools and technologies.
  - Quality control and revision processes.
- **Applications:**
  - Businesses seeking international expansion.
  - Academic researchers needing to access information in other languages.
  - Individuals communicating with foreign language speakers.
- **Examples:** Professional translation agencies, freelance translators, machine translation tools with human editing.

Reprographic Services:

- **Definition:** Duplicating or reproducing physical documents, images, and drawings through various methods.
- **Services:** Photocopying, scanning, printing, microfilming, digitization.
- **Features:**
  - High-quality equipment and trained personnel.
  - Options for various formats and sizes.
  - Document management and archiving capabilities.
  - Security and confidentiality measures.
- **Applications:**
  - Businesses and organizations needing copies of documents for different purposes.
  - Libraries and archives preserving historical materials.
  - Individuals reproducing personal documents or artwork.
- **Examples:** Copy centers, online printing services, library reprographic departments, microfilm bureaus.

Key Differences:

- **Focus:** Translation deals with language and meaning, while reprography deals with physical reproduction.
- **Output:** Translation delivers text in a new language, while reprography delivers copies of existing materials.
- **Expertise:** Translators require linguistic and cultural knowledge, while reprographic staff need technical skills and equipment knowledge.
- **Applications:** Translation serves communication and information access across languages, while reprography serves document management and preservation needs.

Choosing the Right Service:

- **Translation:** Consider accuracy, cultural sensitivity, and subject expertise based on your needs and language pair.
- **Reprography:** Consider image quality, format options, turnaround time, and security measures based on your document requirements and budget.

Online Information Products in Library Science: Nature, Types, and Marketing

Libraries have embraced the digital age, offering a diverse range of online information products to their users. These products cater to various needs and learning styles, expanding access to information beyond the physical library walls.

Nature of Online Information Products:

- **Accessibility:** Accessible 24/7 from anywhere with an internet connection, removing geographical and time constraints. Examples: Accessing e-books while on vacation, reading research articles late at night.
- **Interactivity:** Many products offer interactive features like searching, filtering, and personalization, enhancing user engagement. Examples: Creating custom playlists in streaming media services, personalizing news feeds in library portals.
- **Comprehensiveness:** Can aggregate information from various sources, providing a wider scope than traditional library collections. Examples: Searching across multiple databases simultaneously, accessing online archives with historical materials not found in physical libraries.
- **Timeliness:** Offer up-to-date information with frequent updates and access to real-time data. Examples: Following breaking news through online journals, accessing current stock market data through financial databases.
- **Flexibility:** Can be used on various devices, adapting to different user preferences and contexts. Examples: Reading e-books on smartphones or tablets, listening to audiobooks while commuting.

Types of Online Information Products:

- **E-books and audiobooks:** Digital versions of traditional books, offering portability, searchability, and accessibility for diverse reading needs. Examples: **OverDrive**, **Project Gutenberg**, **LibriVox** (audiobooks)
- **Electronic journals and databases:** Provide access to peer-reviewed research articles, news, and other scholarly publications. Examples: **JSTOR**, **ScienceDirect**, **Academic Search Complete**
- **Streaming media:** Offer access to educational videos, documentaries, and other audio-visual resources. Examples: **Kanopy**, **Films on Demand**, **National Geographic Documentaries**
- **Online learning platforms:** Provide interactive courses, tutorials, and other learning materials. Examples: **Khan Academy**, **Coursera**, **Udemy**
- **Digital archives and repositories:** Offer access to historical documents, photographs, and other primary sources. Examples: **Library of Congress Online Catalog**, **National Archives Digital Vault**, **Smithsonian Institution Digital Library**
- **Research guides and subject portals:** Provide curated resources and information on specific topics, aiding research and discovery. Examples: **University of California Berkeley Library Subject Guides**, **NASA Science Education for Educators**, **ERIC (Educational Resources Information Center)**
- **Library websites and online catalogs:** Offer access to library services, collections, and information about the institution. Examples: **New York Public Library website**, **Library of Congress website**, **Your local public library website**

Marketing Online Information Products:

- **Targeted outreach:** Tailor marketing messages to specific user groups based on their needs and interests. Examples: Creating social media campaigns focused on educational resources for students, highlighting research databases for faculty, promoting streaming media for leisure reading.
- **Social media engagement:** Utilize social media platforms to promote products, showcase features, and interact with users. Examples: Sharing blog posts about new e-book acquisitions, hosting online discussions about research topics, conducting Q&A sessions with librarians.
- **Content marketing:** Create informative and engaging content (blog posts, infographics, videos) highlighting the value of the products. Examples: Publishing blog posts on how to use specific databases effectively, creating infographics showcasing the library's digital collection, developing video tutorials on searching online catalogs.
- **Collaborations and partnerships:** Partner with other institutions or organizations to reach wider audiences. Examples: Collaborating with local schools to promote educational resources, partnering with businesses to offer job-related online learning materials, working with community organizations to provide access to digital literacy training.

User training and workshops: Provide training sessions and workshops to educate users on how to effectively utilize the products. Examples: Conducting workshops on searching academic databases, offering training on using e-readers and audiobooks, organizing sessions on navigating library websites and online catalogs.

Navigating the Information Ocean: Search Engines vs. Meta Search Engines

In today's digital world, finding the information you need amidst the vast ocean of data can feel overwhelming. Search engines and meta search engines are two powerful tools that can help you navigate this information ocean, but they serve different purposes and have their own strengths and weaknesses.

Search Engines:

- **Definition:** Software applications that search the internet based on keywords or phrases you enter.
- **Examples:** Google, Bing, DuckDuckGo, Yandex.
- **Functionality:**
  - Index and store vast amounts of web pages and other online content.
  - Utilize complex algorithms to rank and display results based on relevance, popularity, and other factors.
  - Offer advanced search options like filters, operators, and Boolean logic.
- **Strengths:**
  - Deep and comprehensive search capabilities.
  - Provide personalized search results based on user history and preferences.
  - Offer additional features like image search, news aggregation, and knowledge panels.
- **Weaknesses:**
  - Can be biased towards popular websites or sponsored content.
  - May require advanced search skills to refine results effectively.
  - Privacy concerns regarding data collection and personalized advertising.

Meta Search Engines:

- **Definition:** Services that aggregate results from multiple search engines and present them in a unified format.
- **Examples:** Dogpile, Ixquick, Metacrawler, [invalid URL removed].
- **Functionality:**
  - Send your search query simultaneously to multiple search engines.
  - Aggregate the results and display them in a single list or categorized by the search engine they came from.
  - Often provide basic filtering and sorting options.
- **Strengths:**
  - Broaden your search scope by tapping into multiple search engines simultaneously.
  - Offer a quick overview of results from various sources.
  - Can be useful for discovering alternative perspectives or less well-known websites.
- **Weaknesses:**
  - Results may be less relevant or accurate compared to individual search engines.
  - Limited control over individual search engine algorithms.
  - May experience duplicate results or irrelevant content from different sources.

Choosing the Right Tool:

- **Use search engines:**
  - For specific information needs.
  - When you need deep and comprehensive search results.
  - When you want to leverage advanced search options and personalized features.
- **Use meta search engines:**
  - For a broad overview of the information landscape.
  - To discover alternative perspectives or less well-known websites.
  - When you want to quickly compare results from multiple search engines.

List of Metasearch Engines

Name	Language	Year	Founder
Dogpile	English	1996	Aaron Flin
Excite	English	1995	Graham Spencer, Joe Kraus, Mark Van Haren, Ryan McIntyre, Ben Lutch
Info.com	English	1996	Infocom Corporation
Kayak.com	Multilingual	2004	Steve Hafner, Paul English
Mamma.com		1996	Herman Tumurcuoglu
MetaCrawler	English	1995	Erik Selberg, Oren Etzioni
MetaGer	Multilingual	1996	Wolfgang Sander-Beuermann
Mobissimo	Multilingual	2004	Beatrice Tarka
Otalo.com	English	2006	Alex Bainbridge, Kiran Gupta
Searx	Multilingual	2014	Adam Tauber
Skyscanner	Multilingual	2001	Gareth Williams, Bonamy Grimes, Barry Smith
Wego.com	Multilingual	2005	Craig Hewett, Ross Veitch

List of Defunct or acquired search engines

Name	Backend ownership	Demise
iWon	**Ask.com**	**Shut down after AT&T merger (citation needed)**
Teoma	**Ask.com**	**Merged to Ask.com which still uses its algorithms**
A9.com	**Microsoft Bing**	**Redirect to Amazon homepage (parent company)**
AOL	**Google until 2015, then Microsoft Bing**	**Merged to Yahoo!**
Alexa Internet	**Microsoft Bing**	**Bought by Amazon in 1999, shut down in 2021**
Ciao!	**Microsoft Bing**	**Shut down in 2018**
Ms. Dewey	**Microsoft Bing**	**January 2009**
Groovle	**Google**	**Taken over by Google after Google sued for name similarity**
MySpace Search	**Google**	**Function taken over by Google in 2006**
Mystery Seeker	**Google**	**Novelty "search"; went offline in 2017**
Netscape	**Google**	**Now redirects to AOL**
Ripple	**Google**	**As of 2017 at the latest**
Ecocho	**Google, then Yahoo!**	
Forestle	**Google, then Yahoo!**	**Redirected to Ecosia in 2011**
Yippy	**IBM Watson**	**Redirected to DuckDuckGo in 2021**
Grams	**Grams (anonymous owner)**	**Closed in 2017**

List of General search engines

Name	Language	Backend ownership
Ask.com	Multilingual	Google United States
Baidu	Chinese	Baidu China
Brave Search	Multilingual	Brave United States
Dogpile	English	Metasearch engine
DuckDuckGo	Multilingual	Microsoft Bing United States
Ecosia	Multilingual	Microsoft Bing United States
Elasticsearch	Multilingual	Apache 2.0 until 2021, then Elasticsearch
Exalead	Multilingual	Cloudview France
Excite†	Multilingual	Microsoft Bing United States
Gigablast	English	Apache License 2.0
Google	Multilingual	Google United States
HotBot	English	Microsoft Bing United States
Kagi	English	Metasearch engine and Kagi Inc United States
Lycos	Multilingual	Microsoft Bing United States
MetaCrawler	English	Metasearch engine
Microsoft Bing	Multilingual	Microsoft Bing United States
Mojeek	Multilingual	Mojeek United Kingdom
Opensearch	Multilingual	Apache License 2.0 (Elasticsearch fork)
Petal	Multilingual	Huawei China
Qwant	Multilingual	Microsoft Bing United States
Sogou	Multilingual	Tencent China
Startpage	English	Google United States
Swisscows	Multilingual	Microsoft Bing United States
WebCrawler	English	Microsoft Bing United States
YaCy	Multilingual	GPL-2.0-or-later
Yahoo! Search†	Multilingual	Microsoft Bing United States
Yandex	Multilingual	Yandex Russia
Youdao†	Chinese	NetEase China
You.com	English	Microsoft Bing United States

Internet Search Techniques

Navigating the vast internet requires effective search techniques to find the information you need efficiently and accurately. Here's a breakdown of different techniques with examples:

1. Keyword Search:

- **Definition:** The fundamental method, using relevant keywords or phrases to query search engines.
- **Examples:** Searching for "best smartphones 2023" or "climate change documentaries."
- **Tips:**
  - Use specific and relevant keywords.
  - Combine keywords with logical operators like "AND", "OR", "NOT".
  - Use quotation marks for exact phrases.

2. Boolean Search:

- **Definition:** Utilizes logical operators (AND, OR, NOT) to refine and combine keywords for precise results.
- **Examples:** Searching for "climate change AND impact on oceans" or "artificial intelligence NOT science fiction."
- **Tips:**
  - Understand the meaning and usage of each operator.
  - Use parentheses for complex searches.
  - Combine with keyword optimization for further precision.

3. Proximity Search:

- **Definition:** Ensures keywords appear close together within search results for specific relationships.
- **Examples:** Searching for "artificial intelligence NEAR machine learning" or "Shakespeare WROTE Romeo and Juliet."
- **Tips:**
  - Use proximity operators like "NEAR", "ADJACENT", or quotation marks.
  - Useful for finding specific phrases or author-work relationships.

4. Wildcard Search:

- **Definition:** Utilizes wildcards (*) to represent unknown characters within keywords, broadening your search.
- **Examples:** Searching for "comput* languages" or "Shakespeare's * plays."
- **Tips:**
  - Use wildcards sparingly to avoid overwhelming results.
  - Combine with other techniques for focused searches.

5. Field Searching:

- **Definition:** Targets specific fields within search results, like titles, authors, or publication dates.
- **Examples:** Searching for "title: Hamlet author: Shakespeare" or "publication date:2023."
- **Tips:**
  - Identify relevant field codes for your specific search engine.
  - Use field searches to filter results efficiently.

6. Advanced Search Options:

- **Definition:** Leverage search engine functionalities like filters, date ranges, language restrictions, and site-specific searches.
- **Examples:** Filtering results by language, searching within specific websites, or restricting dates for news articles.
- **Tips:**
  - Explore advanced search options offered by your preferred search engine.
  - Combine advanced options with other techniques for targeted searches.

7. Reverse Image Search:

- **Definition:** Upload an image to find similar images, websites containing the image, or related information.
- **Examples:** Searching for a painting's title or artist, finding similar fashion items, or identifying a species from a photograph.
- **Tips:**
  - Use high-quality images for accurate results.
  - Combine with keyword searches for further information.

8. Specialized Search Engines:

- **Definition:** Utilize search engines designed for specific domains like academic journals, legal documents, or scientific data.
- **Examples:** Searching for academic articles in Google Scholar, legal cases in Westlaw, or scientific data in PubMed.
- **Tips:**
  - Identify relevant search engines for your specific information needs.
  - Utilize their unique search features and filters.

Remember:

- Effective search involves combining different techniques based on your needs and the information you seek.
- Experiment with various approaches and refine your searches using feedback from results.
- Ethical and responsible use of information resources is crucial.

3. Proximity Search:

- **Definition:** Ensures keywords appear close together within search results for specific relationships.
- **Examples:** Searching for "artificial intelligence NEAR machine learning" or "Shakespeare WROTE Romeo and Juliet."
- **Tips:**
  - Use proximity operators like "NEAR", "ADJACENT", or quotation marks.
  - Useful for finding specific phrases or author-work relationships.

4. Wildcard Search:

- **Definition:** Utilizes wildcards (*) to represent unknown characters within keywords, broadening your search.
- **Examples:** Searching for "comput* languages" or "Shakespeare's * plays."
- **Tips:**
  - Use wildcards sparingly to avoid overwhelming results.
  - Combine with other techniques for focused searches.

5. Field Searching:

- **Definition:** Targets specific fields within search results, like titles, authors, or publication dates.
- **Examples:** Searching for "title: Hamlet author: Shakespeare" or "publication date:2023."
- **Tips:**
  - Identify relevant field codes for your specific search engine.
  - Use field searches to filter results efficiently.

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The Internet of Things (IoT) in Library

The Internet of Things (IoT), a network of interconnected physical devices collecting and sharing data, is rapidly transforming various industries, and libraries are no exception. By embracing IoT technology, libraries can enhance their services, improve user experiences, and create a more dynamic and engaging learning environment.

Here are some key applications of IoT in library science:

1. Smart Spaces and Collections:

- **RFID tags:** Embedded in books and materials, these tags enable automated check-in/out, self-service borrowing, and real-time inventory tracking, saving staff time and improving user convenience.
- **Environmental sensors:** Monitor temperature, humidity, and light levels within the library, ensuring optimal conditions for preserving collections and creating a comfortable environment for users.
- **Smart shelves:** Equipped with sensors, these shelves can detect missing items, trigger alerts, and assist with inventory management.

2. Personalized User Experiences:

- **Location-based services:** Offer context-aware recommendations and information based on user location within the library, using beacons or mobile apps.
- **Interactive displays:** Provide digital signage with real-time information about events, resources, and available study spaces.
- **Personalized learning spaces:** Utilize sensors and data to adjust lighting, temperature, and noise levels based on individual user preferences.

3. Enhanced Accessibility and Inclusivity:

- **Wayfinding systems:** Utilize IoT devices to guide users with visual impairments through the library and locate resources.
- **Assistive technology integration:** Integrate IoT devices with assistive technologies like screen readers and voice-activated controls for improved accessibility.
- **Sensory-friendly spaces:** Utilize IoT to create spaces with controlled lighting, noise levels, and other sensory stimuli for users with sensory sensitivities.

4. Data-Driven Decision Making:

- **Collect and analyze data:** Use IoT sensors to gather data on user behavior, resource usage, and space utilization.
- **Gain insights:** Analyze data to understand user needs, optimize resource allocation, and improve library services.
- **Make informed decisions:** Data-driven insights can inform strategic planning, resource allocation, and service development.

Challenges and Considerations:

- **Privacy concerns:** Ensure data collected through IoT devices is used ethically and responsibly, with user consent and appropriate security measures.
- **Cost and infrastructure:** Implementing and maintaining IoT technology requires investment in infrastructure, training, and ongoing maintenance.
- **Integration and interoperability:** Ensure compatibility between different IoT devices and systems to avoid fragmentation and siloed data.

The Future of Library IoT:

As technology evolves, libraries can expect even more innovative IoT applications. Smart furniture, wearables for enhanced accessibility, and integration with artificial intelligence are just a few possibilities. By embracing the potential of IoT while addressing the challenges, libraries can create a more user-centric and efficient environment for the future.

Introduction to Web Servers

In the vast digital landscape, the web plays a crucial role in our daily lives. But have you ever wondered what powers the websites you access? The invisible force behind all that information is the **web server**. This guide will be your introduction to the fascinating world of web servers and unravel their magic.

What is a Web Server?

Simply put, a web server is a specialized computer program or hardware system that stores website files and delivers them to users upon request. When you enter a website address (URL) in your browser, it sends a request to the web server associated with that address. The server then processes the request, retrieves the relevant files like HTML pages, images, and scripts, and sends them back to your browser for display.

Components of a Web Server:

- **Hardware:** The physical computer system that runs the server software.
- **Software:** The web server application, such as Apache, Nginx, or Microsoft IIS, responsible for receiving and processing requests.
- **Content:** The files and data that make up the website, including HTML pages, images, videos, and other resources.
- **Network connection:** The connection that allows the server to communicate with the internet and deliver content to users.

Different Types of Web Servers:

- **Static Web Servers:** Serve pre-built HTML pages without any dynamic content generation.
- **Dynamic Web Servers:** Use scripting languages like PHP, Python, or ASP.NET to generate content on the fly, offering more interactive experiences.
- **Virtual Web Servers:** Allow hosting multiple websites on a single physical server using software like Apache Virtual Hosts.
- **Cloud-based Web Servers:** Leverage cloud computing platforms like Amazon Web Services or Microsoft Azure to provide scalable and flexible hosting solutions.

How Web Servers Work:

1. **User request:** You enter a URL in your browser and press Enter.
2. **DNS lookup:** The browser translates the URL into an IP address, the unique identifier of the web server.
3. **Connection established:** Your browser connects to the web server using the IP address.
4. **Request sent:** The browser sends a request to the server, specifying the desired webpage, file, or resource.
5. **Server processing:** The web server processes the request, locates the requested resource, and prepares it for delivery.
6. **Response sent:** The server sends the requested data back to your browser.
7. **Content displayed:** Your browser receives and interprets the data, displaying the webpage or resource on your screen.

Apache Tomcat Server History

Original author(s)	**James Duncan Davidson**
Developer(s)	The Apache Software Foundation
Initial release	1999; 25 years ago
Stable release	10.1.17 / 12 December 2023
Repository	Tomcat Repository
Written in	Java
Type	Servlet containerHTTP web server
License	Apache-2.0

Introduction to Web Servers: Apache Server and Internet Information Server

Web servers are the backbone of the internet, acting as silent workhorses that deliver web content to your browser when you request it. Two of the most popular and widely used web servers are Apache and Internet Information Server (IIS), each with its own strengths and ideal use cases.

Apache Server:

- **Image of Apache Server logo**
- **Open-source and free to use:** Makes it accessible to individuals and organizations of all sizes.
- **Highly customizable:** Offers a vast array of modules and configurations for specific needs.
- **Cross-platform compatibility:** Runs on various operating systems, including Linux, Windows, and macOS.
- **Large and active community:** Provides extensive support and resources for troubleshooting and customization.
- **Popular choice for:** Personal websites, small to medium businesses, high-traffic websites, and content management systems (CMS) like WordPress.

Internet Information Server (IIS):

- **Developed and supported by Microsoft:** Integrates seamlessly with other Microsoft products and technologies.
- **Robust security features:** Offers strong built-in security measures for enterprise environments.
- **Scalability and performance:** Handles high traffic volumes and complex web applications efficiently.
- **Ideal for:** Windows-based environments, large enterprises, mission-critical applications, and ASP.NET development.

Internet Information Server (IIS) Short details

Information Services 8.5	
Developer(s)	Microsoft
Initial release	May 30, 1995; 28 years ago
Stable release	10.0 v1809 / 2 October 2018
Written in	C++
Operating system	Windows NT
Available in	Same languages as Windows
Type	Web server
License	Part of Windows NT (same license)
Website	www.iis.net

Major Web Servers

Position	Web Server	Founder	Year
1	**Apache**	Apache Software Foundation	**1995**
2	**Tomcat**	James Duncan Davidson	**1999**
3	**NGINX**	Igor Sysoev	**2004**
4	**LiteSpeed**	George Wang	**2003**
5	**CentOS Stream**	CentOS Project	**2004**
6	**Caddy**	Matthew Holt	**2015**
7	**Lighttpd**	Jan Kneschke	**2003**
8	**Microsoft IIS**	Microsoft Corporation	**1995**

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PAPER 2 -UNIT 2

RPSC COLLEGE LIBRARIAN

Saket Sharma

Unit 2

Current Trends and organization of the Web Resources- Web Dewey and UDC online (Brief Description). Brief Introduction of OCLC Classify, Folksonomy: Basic concept, Tagging and Social Bookmarking. Semantic Web: Concept, need, purpose, and advantages. Simple Knowledge organization System (SKOS), Taxonomies and Ontologies.

E-Resources: Collection Development- Types of E-Resources: E-books, E-journals, Databases, Electronic Theses & Dissertations etc., Collection Building Process – Electronic Resource Development Policy; Budgeting, Pricing, Licensing, Ordering and Receiving, Evaluation of e-Resources; Archiving and Preservation of E-Resources.

E-Resources: Negotiations, Licensing, and Access- Model Licenses and Guidelines for Collection Building; Negotiations; Copyright in the Digital Environment/Digital Rights Management (DRM) and User Training; Delivery of E-Resources & Access Management and Authentication; Off-campus and Integrated Access.

E-Resources: Consortia- Growth and Development of Consortia; Collection Building of e-Resources through Consortia; Consortia: e-Shodh Sindhu, CeRA, NKRC, OCLC. E-**Resources: Usage-** Usage Statistics, e-Resource Usage Analysis; Standards and Guidelines (COUNTER); Processing, Analysis and Presentation of Data; Discovery based Services; Usage Enhancement Measures.

WEB DEWEY

WebDewey:

- **Based on:** Dewey Decimal Classification (DDC) system
- **Features:**
  - Access to the most up-to-date DDC numbers
  - Browsing and searching for numbers and concepts
  - Mapping to Library of Congress Subject Headings (LCSH) and MeSH headings
  - Adding personal notes
  - Beginner-friendly interface
- **Use:** Mainly used by librarians and information professionals to organize library collections and resources.
- The first electronic version of "Dewey" was created in 1993. Hard-copy editions continue to be issued at intervals; the online WebDewey and Abridged WebDewey are updated quarterly.
- In 2017 the editorial staff announced that the English edition of DDC will no longer be printed, in favor of using the frequently updated WebDewey
- History: In 1996, DDC made its first steps online with Electronic Dewey on CD-ROM, later evolving into Dewey for Windows. While this annual CD version ceased publication in 2001, the legacy continues with WebDewey (2003) and Abridged WebDewey (2004). Now known as WebDewey 2.0, these online-only versions provide continuous access to licensed users.
- **Website:** http://classify.oclc.org/

UDC ONLINE

UDC Online History:

1931: The Institut International de Bibliographie (IIB) develops the Universal Decimal Classification (UDC) as a multilingual classification system.
1937: IIB becomes the Institut International de Documentation (IID), continuing UDC development.
1992: UDC ownership shifts to the UDC Consortium (UDCC), formed by publishers and institutions.
1993: The Master Reference File (MRF), a comprehensive database of UDC entries, is established.
1996: The first online version of UDC, Electronic Dewey on CD-ROM, is released.
2000: The International Federation for Information and Documentation (FID), responsible for UDC management, dissolves.
2001: Dewey for Windows, the annual CD-ROM version of UDC, ceases publication.
2003: WebDewey, the online version of Dewey Decimal Classification, is launched.
2004: Abridged WebDewey, a condensed version of WebDewey, is introduced.
2013: UDC Online launches, providing full access to the UDC scheme with multilingual support and historical data.
Present: UDC Online continues to be developed and maintained by the UDCC, offering various subscription models for libraries, information centers, and other organizations.
Organization of Knowledge and Layout of the Schedules (Main Tables):
UDC Online is a general classification system encompassing the entire domain of knowledge. Its hierarchical structure borrows from the Dewey Decimal Classification (DDC) with some key differences:

- Main Classes: UDC has 10 main classes (numbered 0-9), with class 4 currently vacant. DDC, on the other hand, has 10 main classes with no gaps.
- Structure: Each main class in UDC is further divided into 10 divisions, then into 10 sections, and so on, using decimal notation. Each level of division can be further subdivided decimally. DDC employs a similar structure, but the minimum class number length can vary.
-

- Flexibility: Unlike DDC, UDC doesn't require a minimum of three digits in a class number, offering greater flexibility for detailed classification.

Auxiliary Tables Any number from the main table can be extended by notation from auxiliary tables, which are of two types:
A) Common Auxiliaries: Universally applicable to all classes for subject and document specification.
B) Special Auxiliaries: Applicable restrictively to a specified class.

COMMON AUXILIARIES

Concept	Symbol	Description
Relations Addition, coordination	**+/ : [ ]**	**la and lb**
Languages	**=0/9**	**lc**
Forms	**(0/09)**	**ld**
Places	**(1/9)**	**le**
Race and nationality	**(=...)**	**lf**
Time	**— ||**	**lg**
Non-UDC numbers	*** and A/Z**	**lh**
General characteristics	**-0**	**lk**
Properties	**-02**	
Materials	**-03**	
Relations, operations, etc.	**-04**	
Persons	**-05**	

EXAMPLES OF COMMON AUXILIARIES

Example	Description
3+5	Social Sciences and Natural Sciences
5/6	Science and Technology
2:5	Religion and Science (Relation)
5+6	Journal of Science and Technology with index [5+6]
512=111	Algebra in English with index 512=111
02(03)	Dictionary of Library Science with index 02(03)
02(03)=112.2	Dictionary of Library Science in German language with index 02(03)=112.2
5"19"	Science in 20th Century
551.5 "2010.12.25"	Weather on Christmas of 2010 with index 551.5 "2010.12.25
5+6 "20" (540)	21st Century Science and Technology in India with index 5+6 "20" (540)
523.6*81 P	Halley's Comet (Number 81P) with index 523.6*81P
821.111 Shak	Works of William Shakespeare with index 821.111 Shak.
004.38*P4	Pentium Four Personal Computer with index 004.38*P4

Special Auxiliaries These three kinds of auxiliaries are applied to a restricted but clearly specified range of numbers. Their functions overlap. These are recognized by sidelining the numbers. These are denoted by

.0 point naught
' Apostrophe
- Hyphen

53 Physics
53.02 General laws of phenomena
53.081 Units and constants [Physics]

FACT SHEET OF UDC ONLINE

- Official Name: Universal Decimal Classification (UDC)
- Description:
  - The Universal Decimal Classification (UDC) is a comprehensive document indexing language presented as a classification scheme that encompasses all domains of knowledge.
  - It is primarily designed for subject description and indexing of information resources regardless of their carrier, form, format, or language.
- Last Release: UDC MRF12 (December 2018)
- Next Release: UDC MRF13 (planned release in 2023)
- Updates/Frequency:
  - UDC releases an updated version of the scheme annually, incorporating extensions and corrections.
- Size:
  - The UDC comprises 72,000 subdivisions.
- Languages:
  - It is available in 57 languages, albeit varying in the extent of detail.
- International Use:
  - The UDC is employed in 135 countries and utilized in 150,000 to 250,000 document collections worldwide.
- Application Areas:
  - UDC finds application in libraries, bibliographic databases, bibliographies, documentation services, information portals, online databases, and publishing endeavors such as journal articles.
- Type of Classification:
  - UDC employs an analytico-synthetic and faceted classification approach.
- Subject Coverage:
  - It covers all areas of knowledge, including disciplines, subdisciplines, and subjects.
- Knowledge Presentation:
  - The UDC schedules are organized hierarchically based on disciplines and feature synthetic elements.
  - The system also incorporates associative relationships and references between concepts and related fields.
- Vocabulary Organization:
  - Classes are organized in tables of common concepts and main knowledge subdivisions subject classes.
- Type of Notation:
  - UDC employs numerals (decimal), symbols, and alphabetical extensions for notation.
  - The notation system is hierarchically and syntactically expressive, with longer numbers indicating deeper hierarchy and symbols used to denote components in complex expressions.
- Ownership of Copyright:
  - The UDC Consortium, based in The Hague, holds the copyright.
- Maintenance:
  - Maintenance of the UDC is overseen by the UDC Editorial Team within the UDC Consortium.
- Distribution:
  - UDC is distributed by the UDC Consortium and licensed publishers.

- Associated Publications:
  - UDC Extensions & Corrections (ISSN: 0014-5424)
- Copyright Restriction:
  - UDC use in document indexing is free and unrestricted in any context.
  - However, distribution and publishing of UDC content, whether in its entirety or as subsets, are restricted to holders of a publishing license.
- Online Schedules:
  - Free access to multilingual UDC summaries and UDC linked data is available.
  - Paid subscription options for access to UDC Online in various languages are also provided.
- Data Format:
  - The UDC is maintained in a database format (mySQL) and distributed in English language as files to publishers and users.
  - Tagged text exports and XML exports are also available.

Brief Introduction of OCLC Classify

OCLC Classify was an experimental service developed by OCLC, a non-profit library cooperative, to assist librarians in assigning classification numbers and subject headings to library materials. It was based on the Functional Requirements for Bibliographic Records (FRBR) model, which aimed to organize bibliographic information in a more user-friendly way.

Here's a brief introduction to OCLC Classify:

- **What it was:** An experimental service that helped librarians classify library materials.
- **What it did:** Assigned classification numbers and subject headings based on the FRBR model.
- **What information it used:** ISBN, ISSN, UPC, OCLC number, author/title, or subject heading.
- **What classification systems it supported:** Dewey Decimal Classification (DDC) and Library of Congress Classification (LCC).
- **What subject heading scheme it used:** Faceted Application of Subject Terminology (FAST).

Why it was discontinued:

OCLC Classify was discontinued on January 31, 2024. There are a few reasons for this:

- **Limited adoption:** The service was not widely adopted by libraries.
- **Alternatives available:** Other tools, such as WorldShare Record Manager and the WorldCat Metadata API, provide similar functionality.
- **Focus on other priorities:** OCLC decided to focus its resources on other development projects.

Alternatives to OCLC Classify:

If you are looking for a tool to help you classify library materials, there are a few alternatives to OCLC Classify available:

- **WorldShare Record Manager:** This is a subscription service from OCLC that provides a variety of tools for managing library catalogs, including a classification number suggestion tool.
- **WorldCat Metadata API:** This is an API that allows you to access and use WorldCat metadata, including classification numbers and subject headings.
- **Library of Congress Classification Online:** This is a free online tool that allows you to browse and search the Library of Congress Classification system.
- **Dewey Decimal Classification Online:** This is a free online tool that allows you to browse and search the Dewey Decimal Classification system.

FOLKSONOMY: BASIC CONCEPT, TAGGING AND SOCIAL BOOKMARKING

Folksonomy: Imagine a library where everyone can add tags to books instead of relying on a single librarian's categorization system. That's the essence of a folksonomy - a collaboratively created system of tags that users apply to online content. It's like a "wisdom of the crowd" approach to classification, where diverse perspectives create a dynamic and evolving system.

Tagging: The building block of folksonomy is tagging. This involves assigning keywords or labels to describe the content. Unlike traditional controlled vocabularies, tags are informal and user-generated, allowing for a more personalized and flexible way to categorize information.

Social Bookmarking: This is a popular application of folksonomy. Users save and share online resources (like websites, articles, or videos) accompanied by tags that describe their content and usefulness. This allows others to discover these resources based on their interests and shared tags, creating a network of interconnected information.

Benefits of Folksonomy:

- **Organic and flexible:** Adapts to changing needs and trends as users add new tags.
- **Personalization:** Users can categorize information based on their own understanding.
- **Discovery:** Users can find content relevant to their specific interests through shared tags.
- **Collaboration:** Encourages knowledge sharing and collective organization of information.

Challenges of Folksonomy:

- **Ambiguity:** Tags can be subjective and open to interpretation, leading to confusion.
- **Inconsistency:** Duplicate tags or inconsistent use can hinder search and discovery.
- **Quality control:** Lack of editorial oversight can lead to irrelevant or inaccurate tags.

Overall, folksonomy offers a unique and powerful way to organize and discover information online. While it comes with its own set of challenges, its collaborative nature and dynamic evolution make it a valuable tool for the digital age.

Additional points:

- Folksonomies are often visualized using tag clouds, which highlight the most frequently used tags.
- They can be applied to various types of content, including photos, music, and even academic papers.
- The success of a folksonomy depends on the community that contributes to it.

5 Examples of Folksonomy:

1. **Flickr:** Photo sharing platform where users upload pictures and tag them with relevant keywords describing the content, location, or theme.
2. **Delicious (defunct):** Social bookmarking site where users saved and shared webpages tagged with keywords describing their content and value.
3. **YouTube:** Videos can be tagged by creators and viewers, helping in searching and categorizing content beyond specific categories.
4. **Stack Overflow:** Q&A platform for programmers where questions are tagged with specific topics and technologies, aiding in finding relevant solutions.
5. **Wikipedia:** Articles are categorized using tags in addition to traditional categories, offering more granular organization and discovery.

5 Examples of Tagging:

1. **Hashtags on Twitter:** Users add hashtags (#) to tweets, categorizing them by topic and making them discoverable based on those tags.
2. **Blog post tags:** Bloggers add tags to their posts, helping readers find similar content or explore specific themes within the blog.
3. **Music genre tags:** Streaming services tag music with genres and subgenres, enabling users to filter and discover music based on their preferences.
4. **Product tags on e-commerce sites:** Products are tagged with relevant keywords describing their features, materials, or uses, aiding in accurate search results.
5. **Image metadata:** Photos taken with digital cameras often contain embedded tags like location, date, and camera settings.

5 Examples of Social Bookmarking:

- **Pinterest:** Users visually curate collections of webpages they find interesting, organizing them using boards and tagging them for discoverability.
- **Pocket:** Users save articles and webpages for later reading, making them accessible across devices and sharing them with others through tags.
- **Diigo:** Offers social bookmarking with advanced features like annotations, highlighting, and group sharing, allowing collaborative learning and content organization.
- **Instapaper:** Streamlined platform for saving and reading articles later, offering tagging and organization options for personal use.
- **Delicious (defunct):** Despite its shut down, Delicious pioneered social bookmarking, allowing users to save and share websites with tags, facilitating information discovery within a community.

SEMANTIC WEB: CONCEPT, NEED, PURPOSE, AND ADVANTAGES.

Concept: Imagine a future where library catalogs aren't just lists of titles and authors, but a web of interconnected knowledge. With the Semantic Web, libraries can move beyond simple keyword searches to empower users with intuitive exploration and deeper understanding of information.

Need: Traditional library systems struggle with:

- **Limited discovery:** Keyword searches often miss relevant resources due to ambiguity and lack of context.
- **Disconnected information:** Resources remain isolated, hindering connections between related works and deeper understanding.
- **Static metadata:** Cataloging data lacks the flexibility to adapt to user needs and diverse interpretations.

Purpose: The Semantic Web brings:

- **Meaningful metadata:** Using ontologies and vocabularies to enrich data with explicit meaning and relationships.
- **Linked data:** Building connections between books, authors, topics, and even entities within different sources, forming a web of knowledge.
- **Reasoning and inference:** Enabling machines to understand context and relationships, supporting advanced search and recommendations.

Advantages for Library Science:

1. **Improved discovery:** Users can explore topics through interconnected concepts, not just specific keywords.
2. **Contextual recommendations:** Recommend related resources based on the user's current exploration and understanding.
3. **Personalized search:** Adapt results based on individual interests and research goals.
4. **Enriched metadata:** Capture rich information about authors, publications, and topics, including relationships and historical context.
5. **Data integration:** Seamlessly combine library data with external sources like research databases and online archives.
6. **Virtual assistants:** Chatbots understand user queries in context, providing better reference services and research assistance.
7. **Knowledge graphs:** Visualize connections between resources, aiding in understanding complex topics and research journeys.
8. **Automatic content analysis:** Extract key concepts and entities from resources, enriching metadata and enabling further exploration.
9. **Digital preservation:** Capture and preserve the context and meaning of digital objects alongside the content itself.
10. **Collaboration and knowledge sharing:** Share semantic-enriched data across libraries and institutions, fostering collective knowledge building.

Challenges:

- **Standardization:** Agreeing on common ontologies and data formats across libraries and information domains.
- **Implementation:** Integrating semantic technologies with existing library systems and workflows.
- **User education:** Training users to understand and leverage the capabilities of the Semantic Web.

SIMPLE KNOWLEDGE ORGANIZATION SYSTEM (SKOS), TAXONOMIES AND ONTOLOGIES.

While all related to organizing information, **SKOS, Taxonomies, and Ontologies** play distinct roles in the information landscape. Let's explore each:

Simple Knowledge Organization System (SKOS):

- **Concept:** Imagine a flexible toolkit for categorizing information without strict hierarchies. SKOS provides basic building blocks to represent thesaurus-like structures, subject heading lists, and even folksonomies.
- **Function:** Simplifies sharing and linking knowledge organization systems across platforms and applications.
- **Library Science Application:**
  - Tagging resources with concepts from different controlled vocabularies or user-generated tags.
  - Creating faceted search interfaces where users can filter and combine concepts for precise discovery.
  - Linking bibliographic data to broader knowledge domains represented in SKOS concepts.

Taxonomies:

- **Concept:** Think of a family tree, where things are categorized based on their hierarchical relationships. Taxonomies organize concepts from most general (e.g., "Living things") to most specific (e.g., "Domestic cat").
- **Function:** Provide clear, structured classification for large sets of information.
- **Library Science Application:**
  - Classifying library materials using established taxonomies like Dewey Decimal Classification (DDC) or Library of Congress Classification (LCC).
  - Browsing resources organized by subject hierarchies within library catalogs.
  - Supporting faceted search interfaces where users navigate through broad to specific categories.

Ontologies:

- **Concept:** Imagine a blueprint for knowledge, explicitly defining concepts, their relationships, and properties. Ontologies are more complex than taxonomies, incorporating rules and logic to represent richer knowledge models.
- **Function:** Enable machines to understand the meaning and relationships within information, facilitating intelligent applications.
- **Library Science Application:**
  - Describing relationships between bibliographic entities (e.g., authors, works, topics) with richer detail than just classification schemes.
  - Supporting semantic search where machines can understand user queries and retrieve relevant resources based on meaning, not just keywords.
  - Enabling reasoning and inference, allowing applications to suggest resources based on context and relationships.

Feature	SKOS	Taxonomy	Ontology
Structure	Flexible, lightweight	Hierarchical	Detailed, with rules and logic
Relationships	Basic concept linking	Parent-child relationships	Complex relationships and properties
Machine understanding	Limited	Partially supported	Fully supported
Library Science application	Tagging, linking, user-driven organization	Classification, browsing, faceted search	Semantic search, knowledge representation, reasoning

SHORT HISTORY OF SIMPLE KNOWLEDGE ORGANIZATION SYSTEM (SKOS).

Simple Knowledge Organization System	
Abbreviation	SKOS
Status	Published (W3C Recommendation)
Year started	1997; 27 years ago
Latest version	Core, Reference, RDF, PrimerAugust 2009, 18; 14 years ago
Organization	World Wide Web Consortium (W3C)
Committee	Semantic Web Deployment Working Group
Authors	Alistair Miles, Sean Bechhofer
Base standards	RDF
Related standards	RDFa, OWL, ISO 25964, Dublin Core
Domain	Semantic Web
Website	www.w3.org/TR/skos-reference/

TYPES OF E-RESOURCES: E-BOOKS, E-JOURNALS, DATABASES, ELECTRONIC THESES & DISSERTATIONS ETC.,

Libraries have gone digital! Gone are the days of dusty shelves and limited access to information. Today, libraries offer a wealth of electronic resources (e-resources) that can be accessed from anywhere, anytime. These resources provide valuable information, tools, and services for research, learning, and entertainment.

Here's a list of different types of e-resources commonly found in libraries, along with 10 examples of each:

1. E-Books: Digital versions of traditional printed books.

- **Fiction:** Project Gutenberg, OverDrive, Libby
- **Non-Fiction:** JSTOR, ScienceDirect, ProQuest Ebook Central
- **Academic:** Ebook Academic Collection, SpringerLink, Taylor & Francis Online
- **Children's:** MackinVIA, World Book Online, Storia

2. E-Journals: Online versions of academic and professional journals.

- **General Interest:** National Geographic, The New Yorker, Scientific American
- **Business:** Harvard Business Review, The Economist, Forbes
- **Science:** Nature, Science, PNAS
- **Social Sciences:** Journal of Personality and Social Psychology, American Sociological Review, Political Science Quarterly

3. E-Newspapers: Digital versions of printed newspapers.

- **National:** The New York Times, The Washington Post, The Wall Street Journal
- **International:** The Guardian, Le Monde, El País
- **Local:** Chicago Tribune, Los Angeles Times, The Boston Globe

4. E-Databases: Large collections of bibliographic records and abstracts, often with full-text access to articles.

- **Multidisciplinary:** EBSCOhost, ProQuest, Gale Cengage Primary Sources
- **Academic:** ScienceDirect, JSTOR, ERIC
- **Business:** Factiva, Mergent Intellect, ABI/INFORM
- **News:** Nexis Uni, Factiva News, Newsbank

5. Streaming Services: Platforms offering access to movies, TV shows, music, and audiobooks.

- **Movies & TV:** Kanopy, Hoopla, Films on Demand
- **Music:** Naxos Music Library, Freegal, Classical Net

- **Audiobooks:** OverDrive, Audible, Libro.fm

6. Online Learning Resources: Websites and platforms offering educational content and courses.

- **MOOCs:** Coursera, edX, Udacity
- **Khan Academy:** Free online Math, Science, and Humanities courses
- **Duolingo:** Free language learning app
- **LinkedIn Learning:** Online professional development courses

7. Government Websites: Websites of government agencies providing information and services.

- **US Federal:** USA.gov, Library of Congress, National Institutes of Health
- **State:** Your state's official website (e.g., CA.gov, NY.gov)
- **Local:** Your city or county's official website

8. Digital Archives: Online collections of historical documents, photographs, and other materials.

- **Library of Congress:** The world's largest library collection
- **National Archives and Records Administration:** U.S. government records
- **Smithsonian Institution:** Museums and research institute collections

9. Social Bookmarking Tools: Websites for sharing and discovering online resources.

- **Diigo:** Annotate and organize webpages
- **Pinterest:** Discover visual content
- **Delicious:** Bookmark and share webpages

10. Research Guides: Online guides created by librarians to help with research on specific topics.

- **Your library's website:** Find guides relevant to your library's collection and services
- **Subject-specific websites:** Many professional organizations and academic institutions offer research guides
- **Government websites:** Many government agencies offer research guides on their topics

E-Resources for Electronic Theses and Dissertations (ETDs)

What are ETDs?

Electronic Theses and Dissertations (ETDs) are digital versions of postgraduate research papers submitted to universities and institutions. They offer valuable insights into current research topics and methodologies. Several online repositories provide access to ETDs from around the world.

Benefits of E-Resources for ETDs:

- **Accessibility:** Find and download ETDs from various universities and institutions globally.
- **Open Access:** Many repositories offer free access to ETDs, promoting wider dissemination of research.
- **Search functionality:** Search ETDs based on keywords, authors, universities, and subjects.
- **Preservation:** Digital format ensures long-term availability and accessibility of research.

10 Examples of E-Resources for ETDs (India & International):

India:

1. **Shodhganga:** National repository for Indian ETDs (https://shodhganga.inflibnet.ac.in/)
2. **ETD@IISc:** Indian Institute of Science ETD archive (http://etd.ncsi.iisc.ernet.in/)
3. **ETD@IITD:** Indian Institute of Technology Delhi ETD archive (http://eprint.iitd.ac.in/dspace/)
4. **MDRF Eprints:** Medical research ETDs from Madras Diabetes Research Foundation (http://mdrf-eprints.in/)
5. **KrishiPrabha:** Agricultural research ETDs from ICAR-India (http://14.139.232.167:8080/css/)

International:

1. **DART-Europe E-Theses Portal:** Aggregates ETDs from European universities ([[invalid URL removed]]([invalid URL removed]))
2. **OAIster:** Global network of digital repositories, including ETDs (https://oaister.worldcat.org/)
3. **Networked Digital Library of Theses and Dissertations (NDLTD):** International consortium for ETD access (https://www.ndltd.org/)
4. **ProQuest Dissertations & Theses Global**: Commercial database with international ETDs (https://dissertations.com/)
5. **EThOS:** ETD archive for UK universities and institutions ([[invalid URL removed]]([invalid URL removed]))

COLLECTION BUILDING PROCESS – ELECTRONIC RESOURCE DEVELOPMENT POLICY; BUDGETING, PRICING, LICENSING, ORDERING AND RECEIVING, EVALUATION OF E-RESOURCES; ARCHIVING AND PRESERVATION OF E-RESOURCES.

Collection Building Process for Electronic Resources: A Step-by-Step Guide

Developing a robust electronic resource collection requires a well-defined process. Here's a breakdown of key steps:

1. Electronic Resource Development Policy:

- **Establish goals and objectives:** Align your e-resource collection with the library's mission and user needs.
- **Define selection criteria:** Determine factors like content relevance, user demand, budget constraints, and licensing terms.
- **Outline evaluation procedures:** Develop metrics to assess resource usage, impact, and cost-effectiveness.
- **Involve stakeholders:** Gather input from faculty, students, and librarians to identify relevant resources.

2. Budgeting, Pricing, and Licensing:

- **Allocate budget for e-resources:** Consider resource costs, subscription fees, and potential renewal expenses.
- **Research pricing models:** Understand different pricing models like per-user, pay-as-you-go, and consortium deals.
- **Negotiate licensing terms:** Pay close attention to access rights, user restrictions, copyright permissions, and embargo periods.
- **Seek cost-effective options:** Explore open access resources, library consortia discounts, and free trial periods.

3. Ordering and Receiving:

- **Utilize library management systems:** Streamline ordering and tracking of e-resources through efficient library software.
- **Verify vendor information:** Ensure accuracy of contact details, access instructions, and technical specifications.
- **Review license agreements:** Thoroughly understand and comply with all terms and conditions before finalizing the order.
- **Test access and troubleshoot:** Conduct access tests with different user groups and address any technical issues promptly.

4. Evaluation of e-Resources:

- **Gather usage data:** Track download statistics, user logins, and other usage metrics provided by the vendor.
- **Conduct user surveys:** Collect feedback from users about the resource's relevance, usability, and overall satisfaction.
- **Compare usage with costs:** Calculate cost per use and assess the return on investment for each resource.
- **Review vendor performance:** Evaluate the vendor's responsiveness, technical support, and communication effectiveness.

5. Archiving and Preservation of e-Resources:

- **Develop an archiving strategy:** Determine which resources need long-term archiving based on their value and user demand.
- **Choose appropriate archiving formats:** Select sustainable and accessible formats for long-term preservation.
- **Partner with archiving organizations:** Consider collaborating with national or regional digital preservation initiatives.
- **Ensure ongoing access:** Maintain access rights and update preservation formats as technology evolves.

More info of **Archiving and Preservation of E-Resources**

The ever-growing reliance on digital information poses a significant challenge: ensuring its long-term accessibility and authenticity. This is where archiving and preservation of e-resources come in.

Here's a breakdown of key points and terms:

What are E-Resources?

Electronic resources (e-resources) encompass any digital information accessible through libraries, including:

- **E-books, e-journals, and e-newspapers**
- **Databases, streaming services, and online learning platforms**
- **Government websites, digital archives, and social bookmarking tools**
- **Research guides and other library-specific resources**

Why Archive and Preserve?

Several factors necessitate the archiving and preservation of e-resources:

- **Format Obsolescence:** Technology evolves rapidly, rendering older formats inaccessible without specialized software or hardware.
- **Content Loss:** Platforms may go defunct, subscriptions may expire, or content may be deliberately removed, leading to data loss.
- **Long-Term Value:** E-resources often hold historical, cultural, and research value that needs to be preserved for future generations.

Key Strategies and Technologies:

- **Emulation:** Creating software that emulates the original hardware and software environment needed to access the resource.
- **Migration:** Converting the resource to a more sustainable format, ensuring long-term readability.
- **Fixity Checks:** Regularly verifying the integrity and authenticity of the resource to detect any alterations.
- **Metadata Management:** Recording detailed information about the resource, its origin, and any changes made, for future reference.
- **Distributed Storage:** Storing copies of the resource across multiple locations to minimize risks from hardware failures or natural disasters.

Challenges and Considerations:

- **Cost:** Archiving and preserving e-resources requires ongoing resources and expertise, which can be expensive for libraries.
- **Selection:** Deciding which resources are valuable enough to preserve for the long term is crucial.
- **Legal Issues:** Copyright restrictions and licensing agreements may limit the preservation options.
- **Technological Dependence:** Preservation strategies rely on ongoing technological advancements, which themselves are subject to change.

Examples of Archiving Initiatives:

- **National Digital Stewardship Alliance (NDSA):** A U.S.-based organization promoting digital preservation best practices.
- **Digital Public Library of America (DPLA):** A collaborative effort to preserve and share digitized public library collections.
- **World Digital Library (WDL):** A UNESCO initiative showcasing significant cultural materials from around the world.

Steps in Archiving and Preserving E-Resources

While the specific approach might vary based on resources and technologies used, here's a general breakdown of the main steps involved in archiving and preserving e-resources:

1. Selection and Appraisal:

- Identify and prioritize which e-resources are valuable enough to archive based on criteria like historical significance, research value, and community needs.
- Consider legal restrictions and copyright limitations on preservation options.

2. Ingestion and Preparation:

- Obtain legal access to the resources and ensure appropriate licenses for preservation.
- Clean and standardize the data format for consistency and future accessibility.
- Extract and record metadata about the resource, including its origin, version, and any modifications made.

3. Storage and Preservation:

- Choose a safe and reliable storage solution with redundancy across multiple locations to minimize risks of data loss.
- Implement strategies like emulation, migration, or encapsulation to ensure long-term readability and avoid format obsolescence.
- Conduct regular fixity checks to verify the integrity and authenticity of the data.

4. Access and Use:

- Develop procedures for accessing the archived resources, considering security, user authorization, and potential licensing restrictions.
- Offer tools and technologies that enable users to discover and interact with the preserved information.

5. Maintenance and Monitoring:

- Continuously monitor the archived resources for potential corruption, technological changes, or evolving access needs.
- Update preservation strategies and technologies as required to ensure long-term accessibility and usability.

E-Resources: Negotiations, Licensing, and Access- Model Licenses and Guidelines for Collection Building

Acquiring and managing e-resources involves complex processes like negotiations, licensing, and access management. To ensure successful implementation, understanding model licenses and guidelines for collection building is crucial.

Model Licenses and Guidelines:

- **Provide a framework:** These pre-defined agreements offer a starting point for negotiation, outlining typical terms and conditions for e-resource licensing.
- **Reduce negotiation time:** They streamline the process by addressing common clauses, allowing you to focus on specific needs and desired terms.
- **Maintain transparency:** Standardized language promotes clarity and fair negotiation for both libraries and vendors.

Popular Model Licenses:

Types of Model Licenses:

- **Creative Commons (CC) Licenses:** Open licenses offering various levels of permission for sharing and reusing content.
- **GNU General Public License (GPL):** Commonly used for open-source software, allowing modification and redistribution.
- **Budapest Open Access Initiative (BOAI):** Framework for open access to scholarly articles.
- **SPARC Open Access Model License:** Free, non-exclusive license for scholarly articles.
- **LIBLICENSE Model License:** Flexible framework for academic library e-resource agreements.
- **EDUCAUSE Model License Agreement:** Standardized license for educational technology resources.
- **OCLC Model License Agreement:** Standard terms for library lending and digital content access.
- **COUNTER Codes of Practice:** Standardized metrics for measuring resource usage.
- **PRONOMS:** Standardized vocabulary for identifying pronouns in online systems.
- **Creative Commons Public Domain Mark:** Indicates content has fallen into the public domain.

Guidelines for Collection Building:

10 Institutions Related to Library Science & E-Resource Collection Building Guidelines:

1. **International Federation of Library Associations and Institutions (IFLA):**
   - A global organization promoting library services and development.
   - Offers comprehensive guidelines and best practices for e-resource collection building in its "Key issues for e-resource collection development: a guide for libraries" document.
2. **American Library Association (ALA):**
   - The leading professional association for librarians in the United States.
   - Publishes guidance and resources on e-resource collection development through its "Guidelines for the Selection and Purchase of Electronic Resources" document.
3. **Association of College and Research Libraries (ACRL):**
   - A division of the ALA focused on academic and research libraries.
   - Provides a wealth of resources and tools for e-resource collection development, including the "Standards for Libraries in Higher Education."

- **Library of Congress (LC):**
  - The national library of the United States.
  - Offers various resources and initiatives related to e-resource preservation and access, including the "Electronic Journals & Electronic Books Collections."
- **National Digital Stewardship Alliance (NDSA):**
  - A collaborative organization working to ensure the long-term preservation of digital information.
  - Provides resources and best practices for digital stewardship, including e-resources.
- **Digital Public Library of America (DPLA):**
  - A collaborative effort to build a national digital library collection.
  - Provides best practices and tools for digital collection development and preservation.
- **Research Libraries Group (RLG):**
  - A membership organization of research libraries committed to collaboration and innovation.
  - Offers resources and tools for e-resource collection development, including the "Principles for Evaluating Electronic Resources."
- **Library and Information Technology Association (LITA):**
  - A division of the ALA focused on technology and its impact on libraries.
  - Provides resources and tools for e-resource collection development and management, including the "Top Technology Trends in Libraries."
- **Consortium of Academic and Research Libraries in Illinois (CARLI):**
  - A library consortium in Illinois providing shared resources and services.
  - Offers resources and tools for e-resource collection development, including the "CARLI E-Resources Management Checklist."
- **National Information Standards Organization (NISO):**
  - A non-profit organization developing standards for information systems and services.
  - Develops and maintains standards relevant to e-resource collection development, such as the "OpenURL framework."

Key Aspects of Negotiations:

- **Access rights:** Negotiate for appropriate access rights for your user base, considering factors like simultaneous users and remote access.
- **Pricing models:** Understand different pricing models (e.g., subscription, pay-per-use) and negotiate for cost-effective options.
- **Licensing terms:** Pay attention to clauses regarding data privacy, archiving rights, and termination provisions.
- **Open access:** Explore options for including open access content within your agreements to promote wider dissemination of research.

Copyright in the Digital Environment/Digital Rights Management (DRM) and User Training; Delivery of E-Resources & Access Management and Authentication; Off-campus and Integrated Access.

Digital Rights Management (DRM) is a set of technologies designed to control access and use of digital content. While it protects copyright holders' interests, its implementation in libraries raises concerns and complexities:

Impact on Libraries:

- **Limited Access:** DRM can restrict how users can access and use e-resources, like limiting simultaneous access, printing, or copying. This can hinder research, teaching, and learning activities.
- **Vendor Lock-in:** Dependence on specific DRM technologies can lock libraries into specific vendors, limiting choice and flexibility.
- **Increased Workload:** Managing DRM settings and user authentication across various platforms can be time-consuming and resource-intensive for libraries.
-

- **Privacy Concerns:** Some DRM practices collect user data, raising privacy concerns and potential conflicts with library values.
- **Accessibility Issues:** Users with disabilities may face barriers accessing DRM-protected resources due to compatibility issues with assistive technologies.

Examples:

- **Limited copying:** E-books with DRM might allow only a few pages to be copied, hindering note-taking and research.
- **Printing restrictions:** Some resources might prevent printing entirely, impacting paper-based learning preferences.
- **Device limitations:** DRM might restrict access to specific devices or platforms, excluding users with incompatible technology.
- **Software incompatibilities:** Older or discontinued DRM software can render resources inaccessible, creating long-term preservation challenges.

Libraries' Responses:

- **Advocate for Fair Use:** Libraries actively advocate for balanced copyright laws that respect both creators' rights and users' fair use for research, education, and learning.
- **Negotiate Flexible Licenses:** Libraries negotiate with vendors for licenses with less restrictive DRM terms, promoting user access and responsible use.
- **Support Open Access Resources:** Libraries support open access initiatives and resources that offer unrestricted access and use, benefiting researchers and the public.
- **Educate Users:** Libraries educate users about copyright and DRM limitations, equipping them with responsible user practices.
- **Collaborate for Change:** Libraries collaborate with other institutions and advocacy groups to push for reforms in DRM practices and copyright legislation.

Overall, while DRM plays a role in protecting content, its impact on libraries needs careful consideration. Libraries strive to balance copyright compliance with user needs, advocating for fair and accessible e-resources for all.

User Training for E-Resources

Here are some more key points with examples for E-Resource User Training:

1. Resource-Specific Training:

- **Database Tutorials:** Develop short video tutorials demonstrating key search features and functionalities of specific databases used in different disciplines (e.g., PubMed for healthcare, ProQuest for business studies).
- **E-Book Platforms:** Offer workshops demonstrating how to navigate e-book platforms, download options, citation tools, and accessibility features.
- **Streaming Services:** Host sessions showcasing the library's streaming services, search options, content types, and recommendations based on user interests.

2. Advanced Skills Development:

- **Data Analysis Workshops:** Conduct workshops teaching users how to analyze quantitative data extracted from e-resources using visualization tools or spreadsheets.
- **Literature Review Skills:** Facilitate sessions on using e-resources effectively for literature reviews, including keyword selection, advanced search operators, and critical evaluation of sources.
- **Citation Management Tools:** Train users on how to utilize citation management software like Mendeley or Zotero to organize and format references from e-resources.

3. Tailored Training:

- **Faculty-Librarian Collaboration:** Partner with faculty to integrate library instruction sessions into courses, specifically targeting e-resource usage relevant to the coursework.
- **Student Orientation Programs:** Include a segment on e-resource access, search strategies, and responsible use during library orientation sessions for new students.

Delivery of E-Resources & Access Management and Authentication:

Examples:

- **Developing user-friendly search interfaces:** Simplifying discovery and access to e-resources.
- **Implementing single sign-on (SSO):** Providing seamless access across different platforms.
- **Integrating e-resources with library catalogs:** Enabling seamless discovery of both print and digital materials.
- **Offering mobile access:** Allowing users to access e-resources on their smartphones and tablets.
- **Utilizing IP authentication:** Restricting access to licensed resources to authorized users.
- **Employing multi-factor authentication (MFA):** Enhancing security for sensitive resources.

Off-campus and Integrated Access:

Examples:

- **Providing remote access to e-resources:** Enabling users to access resources from home or other locations.
- **Collaborating with other institutions:** Sharing resources and access through library consortia.
- **Developing mobile apps for e-resource access:** Offering convenient access on the go.
- **Integrating e-resources with learning management systems (LMS):** Providing seamless access within educational platforms.
- **Offering authentication options for off-campus users:** Utilizing remote access authentication protocols.
- **Promoting awareness of off-campus access options:** Educating users about available resources and methods

Commercial and Free Tools for Off-Campus Access in Indian Libraries

Commercial Tools:

1. **EZproxy:** Enables seamless off-campus access to library resources by automatically authenticating users through their institutional credentials. **Paid service.**
2. **Shibboleth:** Provides secure access to protected online resources based on institutional affiliation. **Open-source software with implementation costs.**
3. **RemoteXS:** Cloud-based platform for managing remote access services, including VPN access, virtual desktops, and secure file sharing. **Paid service.**
4. **Athens:** Access management platform offering single sign-on and seamless access to e-resources for authorized users. **Paid service.**
5. **DigiLex:** Provides libraries with remote desktop solutions for accessing specialized software and resources off-campus. **Paid service.**

Free Tools:

1. **Institutional Repository Platforms:** Many open-source platforms like DSpace, EPrints, and Fedora Commons enable universities and institutions to create and manage their own digital repositories, providing open access to research outputs and learning materials.
2. **OpenVPN:** Open-source software for creating secure virtual private networks (VPNs) to grant off-campus users encrypted access to library resources.
3. **NoMachine:** Open-source remote desktop software allowing users to access desktop applications and resources within the library network remotely.
4. **Open access resources:** National initiatives like Shodhganga, ShodhGangotri, and OpenAIRE India offer free access to research publications and resources.
5. **Library websites and portals:** Most libraries provide dedicated sections on their websites with instructions and links for remote access using basic authentication or free tools like OpenVPN.

Additional Considerations:

- Many institutional library management systems (LMS) may have built-in functionalities for remote access, such as proxy authentication or mobile apps.
- National initiatives like INFLIBNET and DELNET offer access to e-resources for affiliated institutions, often requiring institutional subscriptions but providing cost-effective solutions.

E-RESOURCES: CONSORTIA- GROWTH AND DEVELOPMENT OF CONSORTIA; COLLECTION BUILDING OF E-RESOURCES THROUGH CONSORTIA; CONSORTIA: E-SHODH SINDHU, CERA, NKRC, OCLC.

E-Resources: Consortia - Growth and Development in India

Consortia have played a crucial role in the growth and development of e-resources in India, offering libraries access to a wider range of resources at more affordable prices. Here's an overview:

Objectives of Library Consortia:

- Develop cooperative and consortial solutions to challenges faced by member libraries.
- Assist member libraries in pursuing and achieving their institutional objectives.
- Provide strong leadership and opportunities for innovation for research communities.
- Offer physical and virtual access to shared resources of all member libraries.
- Establish a framework of mutual support to develop individual and collective strengths.
- Raise the profile of libraries and members in appropriate forums to highlight their value to the research community.
- Develop future directions for libraries through strategic planning.
- Consider national library missions and memberships.
- Identify funding priorities within libraries and influence national agendas for research support funding.
- Influence national agencies engaged in consortial purchase activities to prioritize research and scholarship needs.
- Publicize and disseminate information about libraries and activities widely.
- Participate in consultation processes.
- Provide access to bibliographic records of all member libraries.

Resource Sharing Programs:

- Implement strategies for enhanced access to and provision of catalogue records for serials.
- Enrich provision of machine-readable bibliographic records for print and non-print resources in member libraries.
- Provide access to consortium holdings recorded on a union catalogue for information location.
- Offer metadata for electronic resources accessible from consortium libraries.

Objective of Library Consortia

- Licensing and Content Negotiation:
  - Negotiating favorable licensing agreements for electronic resources.
  - Ensuring access to high-quality resources at better pricing for member libraries.
- Consortial Purchasing:
  - Leveraging collective buying power for discounted rates on library supplies and services.
  - Maximizing cost savings and resource value for member libraries.
- Shared Technology Infrastructure:
  - Providing shared technology services like integrated library systems and digital repositories.
  - Offering cost-effective and advanced technological solutions to enhance library operations.
- Cooperative Collection Development:
  - Coordinating selection and acquisition of materials to build comprehensive collections.
  - Minimizing duplication and optimizing funds allocation for effective resource utilization.
- Professional Development:
  - Organizing workshops, conferences, and training programs for library staff.
  - Enhancing skills and fostering collaboration among library professionals.
- Shared Print Programs:
  - Establishing initiatives for preserving and providing access to physical materials.
  - Reducing duplication and optimizing space utilization for print resources.
- Advocating for Libraries:
  - Engaging in advocacy efforts at local, regional, and national levels.
  -

    - Raising awareness of libraries' value and advocating for increased support.
- Data Collection and Analysis:
    - Gathering usage statistics and other metrics to inform decision-making.
    - Assessing the impact of consortial activities and informing strategic planning.

Growth of Consortia:

- **Early days:** INFLIBNET's UGC-INFLIBNET Digital Library Consortium (INFLIBNET Consortium) established in 1998 marked a significant step, providing access to international e-journals for Indian universities.
- **Rapid expansion:** Numerous consortia emerged, including INDEST (engineering and technology), DELNET (general resources), and VIVA (medical sciences), catering to diverse needs.
- **Government initiatives:** The National Knowledge Network (NKN) and initiatives like Shodhganga (ETD repository) further propelled growth.

Key Factors Driving Growth:

- **Cost-effectiveness:** Consortia negotiate bulk discounts with vendors, reducing per-user costs for libraries.
- **Improved access:** Libraries can offer users access to a wider range of resources than they could afford individually.
- **Shared expertise:** Consortia facilitate collaboration and knowledge sharing among libraries on e-resource management and negotiation strategies.
- **Advocacy:** Consortia advocate for open access and fair pricing models for e-resources, benefiting libraries and researchers.

Challenges and Opportunities:

- **Sustainability:** Ensuring long-term financial sustainability of consortia, especially with rising costs of e-resources.
- **Inclusion:** Bringing smaller libraries and non-profit institutions into the fold to promote equitable access.
- **Data management:** Effectively managing and analyzing usage data to guide resource selection and negotiate better deals.
- **Emergence of new technologies:** Adapting to new technologies like cloud-based platforms and open access models.

Examples of Growth and Development:

- **INFLIBNET Consortium:** Expanded to include over 1,200 universities, offering access to over 100,000 e-journals and other resources.
- **INDEST Consortium:** Successfully negotiated access to key engineering and technology databases for its members.
- **DELNET Consortium:** Grown to include over 1,500 libraries, providing access to a diverse range of e-resources.
- **Open access initiatives:** Shodhganga and other repositories promoting open access to research outputs from India.

Looking Ahead:

- Continued growth of consortia and adoption of open access models.
- Focus on data-driven decision making and user-centric resource selection.
- Collaboration between consortia and publishers to develop sustainable and equitable access models.
- Leveraging technology to streamline workflows and improve resource management.

Overall, consortia have played a vital role in transforming the e-resource landscape in India. By addressing challenges and embracing opportunities, they can continue to ensure equitable access to information and empower libraries to support research and learning in the digital age.

CONSORTIA: E-SHODH SINDHU, CERA, NKRC, OCLC.

e-Shodh Sindhu:

- **Launched:** 2015
- **By:** Ministry of Human Resource Development (MHRD), Government of India
- **Access to e-resources:** Provides a comprehensive collection of e-journals, e-books, and databases to subscribing academic institutions in India.
- **Coverage:** Science, technology, engineering, medicine, social sciences, and humanities.
- **Benefits:** Facilitates research and learning by providing access to high-quality, peer-reviewed content.

CeRA: Consortium for e-Resources in Agriculture (Updated)

Established: November 2007

Mission: Facilitate 24/7 online access to select journals in agricultural and allied sciences for researchers, teachers, students, policy planners, and others in the National Agricultural Research System (NARS) through IP authentication.

Key Facts:

- First of its kind consortium in India focused on agricultural e-resources.
- One of five prominent consortia in the country.
- 143 members, including ICAR institutes, state agricultural universities, and other NARS institutions.
    - Provides access to:3,490 journals:2,046 consortium-subscribed
    - 501 open access
    - 943 library-subscribed
  - 2 databases: CABI and Web of Science
  - Two websites:http://cera.iari.res.in
  - http://www.jgateplus.com (access)
  - Offers access to:Full text articles of all journals
  - Workshops and training on effective resource utilization
- Popular platform for NARS researchers and educators for literature search.

National Knowledge Resource Consortium (NKRC): A Comprehensive Update

Established: 2009

Origin: Emerged from the CSIR Electronic Journals Consortium, founded in 2001, initially providing access to 1200+ Elsevier Science journals.

Network: Connects libraries and information centers of 43 CSIR and 26 DST institutes.

Resources:

- **5,000+ e-journals:** Covering diverse disciplines across major publishers.
- **Patents and Standards:** Facilitating access to crucial intellectual property information.
- **Citation and Bibliographic Databases:** Enabling efficient research navigation and discovery.
- **Open Access Resources:** Promoting accessible knowledge dissemination.

Mission:

- Serve as a single point of access for information needs of the R&D sector.
- Strengthen the research and development system in India by providing vital information resources.
- Advocate for open access and information equality.

Impact:

- Expanded access to high-quality scholarly resources for Indian researchers.
- Reduced costs for participating institutions through consortium negotiations.
- Promoted open access initiatives and knowledge sharing.
- Contributed to India's scientific research advancement.

Future Vision:

- Continue expanding resource collection and accessibility.
- Foster collaboration and information sharing among member institutions.
- Play a leading role in open science and knowledge equity initiatives.

Additional Information:

- NKRC offers user training and workshops to optimize resource utilization.
- Collaborates with national and international organizations to enhance resource discovery and access.
- Provides valuable insights into research trends through data analysis and usage statistics.

OCLC: A Global Leader in Library Cooperation

While your initial description of OCLC is accurate, here's a more detailed look at the organization and its impact:

Founded in 1967, OCLC (originally the Ohio College Library Center) has evolved into a **global non-profit cooperative** serving over **18,000 libraries in 120 countries**. It's more than just an online catalog; it's a central hub for collaborative resources and services, empowering libraries to:

1. Cataloging and Metadata:

- **WorldCat:** The world's largest online public access catalog, containing over **500 million bibliographic records** for various materials, accessible to libraries and the public.
- **Shared Cataloging:** Libraries contribute and edit records, ensuring consistent and accurate information for users.
- **Dewey Decimal Classification:** OCLC maintains and licenses the DDC, a widely used system for organizing library collections.

2. Interlibrary Loan and Resource Sharing:

- **WorldShare Interlibrary Loan:** Streamlines borrowing and lending materials between libraries, facilitating access to wider collections.
- **Resource Sharing:** OCLC fosters collaboration through initiatives like SHARES, which allows partner libraries to share their unique collections.
- **Delivery Services:** OCLC partners with couriers to offer fast and reliable delivery of borrowed materials.

3. Research and Innovation:

- **OCLC Research:** Conducts original research on library trends, technologies, and user needs, informing best practices and future directions.
- **Developing Innovative Solutions:** OCLC creates and implements new technologies like the WorldShare Management Services platform for library management.
- **Supporting Open Access:** OCLC advocates for open access to research and scholarship, making knowledge more accessible to everyone.

4. Benefits for Libraries:

- **Reduced Costs:** Sharing resources and collaborating on projects saves libraries money and optimizes resources.
- **Improved Efficiency:** Streamlined workflows and technology tools boost library productivity and user service.
- **Enhanced Access:** Users gain access to a wider range of materials and information through resource sharing and WorldCat.
- **Professional Development:** OCLC offers training and resources to help librarians develop their skills and knowledge.

5. Global Impact:

- **Connecting Libraries:** OCLC fosters international collaboration, enabling libraries around the world to learn from each other.
- **Preserving Knowledge:** OCLC supports initiatives to preserve digital information and ensure long-term access to scholarly resources.
- **Promoting Literacy:** OCLC collaborates with organizations to promote reading and information literacy worldwide.

OCLC is more than just an online catalog; it's a powerful force for collaboration, innovation, and access to information for libraries and their users globally.

E-Resources: Usage- Usage Statistics, e-Resource Usage Analysis; Standards and Guidelines (COUNTER); Processing, Analysis and Presentation of Data; Discovery based Services; Usage Enhancement Measures

E-Resources: Usage, Statistics, and Analysis

E-resources are a vital part of modern libraries, offering convenient and diverse access to information. To understand their effectiveness and optimize their utilization, libraries rely on **usage statistics and analysis**.

Understanding E-Resource Usage:

- **What data is collected?** Typically includes metrics like downloads, views, full-text access, searches, user demographics, and session duration.
- **Benefits of understanding usage:**
  - Identifies popular and underutilized resources.
  - Informs resource selection and renewal decisions.
  - Tracks return on investment (ROI) for subscriptions.
  - Provides insight into user needs and preferences.
  - Helps tailor services and promotions based on usage patterns.

Types of E-Resource Usage Statistics:

- **Basic statistics:** Downloads, views, full-text access, unique users, etc.
- **Usage by user group:** Students, faculty, researchers, etc.
- **Usage by time period:** Daily, weekly, monthly, yearly.
- **Usage by platform or database:** Provides insights into specific tools.
- **Geographic usage:** Tracks access from different locations.
- **Citation analysis:** Measures the impact of resources on research.

Analyzing E-Resource Usage:

- **Quantitative analysis:** Uses statistical tools to identify trends and patterns.
- **Qualitative analysis:** Involves user feedback, surveys, and focus groups to understand user experiences and motivations.
- **Benchmarking:** Compares usage data with other libraries or industry standards.
- **Cost-benefit analysis:** Measures the value of e-resources compared to their cost.

Challenges of E-Resource Usage Analysis:

- **Data overload:** Managing and analyzing large datasets can be complex.
- **Privacy concerns:** Balancing data collection with user privacy needs careful consideration.
- **Standardization:** Different vendors and platforms use varying metrics, hindering comparisons.
- **Interpretation:** Analyzing data responsibly and avoiding misinterpretations is crucial.

Tools and Resources:

- **Vendor-specific reports:** Most vendors provide basic usage data reports.
- **LibQual+:** A standardized survey to assess user satisfaction with library services and resources.
- **COUNTER (Counting Online Usage of Networked Electronic Resources):** Provides standardized usage metrics for e-resources.
- **SPARC (Scholarly Publishing and Academic Resources Coalition):** Promotes open access and provides resources for e-resource management.

Tools for Analyzing E-Resource Usage Counts:

General-Purpose Tools:

- **Google Analytics:** Provides website traffic data, including e-resource access from library websites.
- **Adobe Analytics:** Similar to Google Analytics, offers detailed user behavior insights.
- **Tableau/Power BI:** Data visualization tools for creating insightful reports and dashboards.
- **Open Refine:** Open-source data cleaning and transformation tool for preparing data for analysis.

Library-Specific Tools:

- **Ebsco Discovery Service (EDS) Usage Statistics:** Comprehensive reports on search behavior and resource access within EDS.
- **ProQuest Summon Usage Reports:** Detailed usage data for resources accessed through Summon.
- **Gale Analytics and Usage Reports:** Comprehensive reporting for Gale databases and e-journals.
- **SpringerNature SpringerLink Analytics:** Usage data for SpringerLink platform resources.
- **Wiley Usage Data Services:** Detailed reports on access to Wiley e-books and journals.

Standards and Guidelines (COUNTER): A Comprehensive Guide

COUNTER stands for **Counting Online Usage of Networked Electronic Resources**. It's a set of international standards and guidelines for measuring and reporting online usage of e-resources, like e-journals, databases, and e-books. These standards promote transparency and consistency in usage data, enabling libraries, publishers, and other stakeholders to make informed decisions.

Key Features of COUNTER:

- **Standardized metrics:** Defines a set of common metrics for measuring various aspects of e-resource usage, including:
  - **Title-level metrics:** Downloads, full-text views, searches, etc.
  - **Session-level metrics:** User sessions, unique users, etc.
  - **Database-level metrics:** Searches, referrals, etc.
- **Regular updates:** The COUNTER Code of Practice is regularly updated to reflect evolving technologies and user needs.
- **Independent auditing:** COUNTER reports can be audited by third-party organizations for accuracy and compliance.
- **Multiple formats:** COUNTER reports are available in various formats, including COUNTER-compliant XML and flat files.

Benefits of Using COUNTER:

- **Improved data quality and comparability:** Standardized metrics and reporting formats ensure accurate and comparable data across different platforms and resources.
- **Informed decision-making:** Libraries can use usage data to make informed decisions about resource selection, licensing, and budget allocation.
- **Transparent reporting:** COUNTER reports provide transparency to publishers and other stakeholders about resource usage patterns.
- **Enhanced collaboration:** COUNTER facilitates collaboration between libraries and publishers by providing a common language for discussing usage data.

E-Resource Management: Processing, Analysis, Presentation, Discovery, and Usage Enhancement

Effective management of e-resources involves various crucial steps, from data processing and analysis to user discovery and engagement. Here's a breakdown of these key aspects:

1. Processing, Analysis, and Presentation of Data:

- **Data Collection:** Gathering usage data from various sources like COUNTER reports, platform logs, and user surveys.
- **Data Cleaning and Standardization:** Ensuring data accuracy and consistency across different sources and formats.
- **Data Analysis:** Interpreting usage patterns, identifying trends, and evaluating resource effectiveness.
- **Data Visualization:** Presenting insights through reports, dashboards, and infographics for clear communication.

2. Discovery-Based Services:

- **Metadata Management:** Ensuring accurate and comprehensive metadata descriptions for resource discovery.
- **Search Engine Optimization (SEO):** Optimizing library websites and resources for better search engine visibility.
- **Subject Gateways and Portals:** Creating curated collections and thematic pathways for user-friendly navigation.
- **Integration with Discovery Services:** Linking e-resources with library catalogs and discovery platforms.

3. Usage Enhancement Measures:

- **User Training and Workshops:** Educating users on effective resource search, retrieval, and navigation.
- **Promotion and Outreach:** Highlighting new resources, highlighting usage statistics, and showcasing success stories.
- **Integration with Learning Management Systems (LMS):** Making resources easily accessible within the learning environment.
- **Link Resolvers and OpenURL Integration:** Providing seamless access to full-text articles from citations.
- **Personalized Recommendations:** Suggesting relevant resources based on user behavior and interests.

Additional Considerations:

- **Data Privacy and Security:** Implementing measures to protect user data privacy and comply with regulations.

- **Accessibility:** Ensuring resources are accessible to users with disabilities.
- **Collaboration:** Working with publishers and other stakeholders to improve resource discovery and usage.

Software and Tools for Discovery-Based Services in Library Databases:

Several software and tools can enhance discovery within your library database, offering user-friendly interfaces, advanced search capabilities, and personalized recommendations. Here are some popular options, categorized by their approach:

1. Open-Source Discovery Services:

- **Blacklight:** A flexible and customizable platform built on Ruby on Rails, offering faceted search, relevancy ranking, and integration with various library systems.
- **VuFind:** A user-friendly interface with intuitive search and browse options, built on a PHP framework.
- **Koha:** An integrated library system with a built-in discovery layer, offering basic search and browsing functionality.

2. Commercial Discovery Services:

- **EBSCO Discovery Service (EDS):** Provides a unified search interface across various databases, with features like citation analysis and recommendation engines.
- **Summon (ProQuest):** Offers a user-friendly interface with integrated searching across library catalogs and external resources.
- **Primo (Ex Libris):** A customizable platform with advanced search capabilities, highlighting specific resources and collections.
- **WorldCat Discovery (OCLC):** Leverages the vast WorldCat database, offering access to library collections worldwide.

3. Specialized Discovery Tools:

- **Digital Public Library of America (DPLA):** Provides access to digitized collections from libraries across the US, with advanced search and browse options.
- **Europeana:** Offers access to digitized cultural heritage materials from European institutions, with multilingual search and filtering options.
- **Google Scholar:** While not specifically a library tool, it offers powerful search capabilities for scholarly articles and publications.

Choosing the Right Tool:

The best tool for your library depends on several factors, including:

- **Budget:** Open-source options are generally free, while commercial tools require subscriptions.
- **Technical Expertise:** Open-source tools require more technical knowledge to implement and maintain.
- **User Needs:** Consider your specific user base and their preferred search and browsing styles.
- **Integration:** Ensure compatibility with your existing library systems and databases.

ADDITIONAL NOTES- COUNTER HISTORY

2002:

- Publishers and librarians approached usage statistics from different perspectives.
- Initial discussions and debates on the necessity and benefits of standardizing usage statistics.

2003:

- Project COUNTER officially launched to develop standards for recording and reporting online publication usage.
- Release 1 of the COUNTER Code of Practice for Journals and Databases published.

2005:

- Release 2 of the COUNTER Code of Practice published.
- Nearly 100 COUNTER-compliant vendors, providing reports for over 15,000 journals, databases, and books.
- Introduction of the SUSHI protocol for automated retrieval of usage reports.

2009:

- Release 3 of the Code of Practice for Journals and Databases introduced, replacing Release 2.

2013:

- Release 4 of the COUNTER Code of Practice published, integrating journals, databases, books, and multimedia content.

2014:

- Introduction of two new Codes of Practice:
  - COUNTER Code of Practice for Articles, setting a standard for recording and reporting usage at the individual article level.
  - Code of Practice for Usage Factors, enabling publishers to calculate Usage Factors for journals based on COUNTER data.

2017:

- Consultation with communities to develop Release 5 of the Code of Practice (effective from January 2019).
- Aimed for improved consistency, clarity, and flexibility to adapt to changing digital publishing trends.

Current Projects:

- Development of a Code of Practice for recording and reporting the usage of research data.

ADDITIONAL NOTES- PLUM ANALYTICS HISTORY

2011:

- Plum Analytics founded in Philadelphia, Pennsylvania by Andrea Michalek and Mike Buschman.
- Introduced PlumX as the company's flagship product, offering altmetrics for scholarly works.

2017:

- Elsevier acquired Plum Analytics in February, purchasing it from EBSCO Information Services.
- PlumX metrics integrated into Elsevier's existing products, including Mendeley and Scopus.

Product and Services:

- **PlumX:** Initially launched as Plum Analytics' primary product, providing altmetrics for peer-reviewed journal articles and scholarly works.
- **PlumX Suite (August 2015):**
  - Metrics: Aggregates altmetrics data.
  - Dashboards: Provides visualization tools for data analysis.
  - +Grants: Helps researchers discover grant opportunities.
  - Benchmarks: Allows comparison of research outputs.
  - Funding Opportunities: Identifies potential sources of funding for research projects.

ADDITIONAL NOTES- ALMETRICS HISTORY

Altmetrics Overview:

- Altmetrics proposed as non-traditional bibliometrics, offering an alternative or complement to traditional citation impact metrics.
- Term "altmetrics" introduced in 2010, stemming from the #altmetrics hashtag.
- Altmetrics encompass various types of metrics beyond articles, including people, journals, books, datasets, presentations, videos, etc.
- Altmetrics utilize public APIs across platforms to gather data, focusing on diverse online research outputs such as social media, news media, reference managers, etc.
- Adoption of altmetrics has increased with the development of web 2.0, providing new ways to measure the broad scientific impact of scholarly work.

Adoption and Usage:

- Projects like ImpactStory and companies like Altmetric, Plum Analytics, and Overton calculate altmetrics.
- Several publishers, including BioMed Central, PLOS, Frontiers, Nature Publishing Group, and Elsevier, provide altmetric information to readers.
- Funders, such as the UK Medical Research Council, show interest in alternative metrics.
- Altmetrics are used in promotion reviews by researchers, and universities like the University of Pittsburgh experiment with altmetrics at an institutional level.

Altmetrics Categories:

- Proposed classification by ImpactStory and Public Library of Science:
  - Viewed: HTML views and PDF downloads
  - Discussed: Journal comments, science blogs, social media (e.g., Twitter, Facebook)
  - Saved: Mendeley, CiteULike, and other social bookmarks
  - Cited: Citations in scholarly literature tracked by Web of Science, Scopus, CrossRef, etc.
  - Recommended: Usage by platforms like F1000Prime.

ADDITIONAL NOTES- CREATIVE COMMON LICENSE HISTORY

Creative Commons Licenses: Navigating the Four Rights

Creative Commons licenses offer varying degrees of permission for sharing and using copyrighted work. They provide a simple framework built on four key rights:

1. Attribution (BY): You must credit the original creator.

2. Share-Alike (SA): You can create derivative works, but they must share the same license as the original.

3. Non-Commercial (NC): You can use the work for non-commercial purposes only.

4. No Derivative Works (ND): You can only share verbatim copies, no modifications allowed.

Combining these rights creates different license options:

- **BY:** Most permissive, allows all uses with attribution.
- **BY-SA:** Shares derivative works under the same license.
- **BY-NC:** Allows non-commercial use and derivative works with attribution.
- **BY-ND:** Allows sharing verbatim copies with attribution.
- **BY-NC-SA:** Restricts to non-commercial, share-alike use with attribution.
- **BY-NC-ND:** Allows sharing verbatim copies for non-commercial use with attribution.

Creative Commons: Beyond Copyright Licenses

Creative Commons offers more than just copyright licenses. Here's a breakdown of some key points:

CC0: Public Domain Dedication:

- Tool to relinquish copyright and release material into the public domain.
- Waives as many rights as legally possible.
- Acts as a fallback for when true public domain is not achievable.
- Initially targeted towards scientific data but has broader applications.

Public Domain Mark:

- Labels works already in the public domain.
- Replaces the US-centric Public Domain Dedication and Certification.

Relationship with Free Software:

- Free Software Foundation added CC0 to their free software licenses but currently **discourages** its use due to the lack of explicit patent license grant.

Open Source Initiative (OSI) Controversy:

- CC0 submission for OSI approval was withdrawn due to concerns about the patent exclusion clause.
- The clause was intended for scientific data, but some saw it as weakening software users' rights.

Unsplash and CC0:

- Stock photo website Unsplash formerly used CC0 but switched to a custom license in 2017 and a non-free license in 2018.

Open Knowledge Foundation and CC0:

- Open Knowledge Foundation recommends CC0 for dedicating content to the public domain.

Fedora Linux and CC0:

- Fedora Linux banned CC0 software due to lack of explicit patent waiver.

Retired Licenses:

- Several Creative Commons licenses have been retired due to low adoption or criticism.
- These include licenses without attribution and those specific to developing nations or sampling.

Takeaways:

- CC0 offers a powerful tool for releasing works into the public domain.
- Its application in certain areas, like software, requires careful consideration due to potential patent implications.
- Creative Commons provides various options for content creators and users to navigate copyright and public domain.

License compatibility chart for combining or mixing two CC licensed works[64][65]

	PUBLIC DOMAIN / PUBLIC DOMAIN	BY	BY SA	BY NC / BY NC SA	BY ND / BY NC ND
PUBLIC DOMAIN / PUBLIC DOMAIN	✓	✓	✓	✓	✗
BY	✓	✓	✓	✓	✗
BY SA	✓	✓	✓	✗	✗
BY NC / BY NC SA	✓	✓	✗	✓	✗
BY ND / BY NC ND	✗	✗	✗	✗	✗

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PAPER 2 -UNIT 3

RPSC COLLEGE LIBRARIAN

Saket Sharma

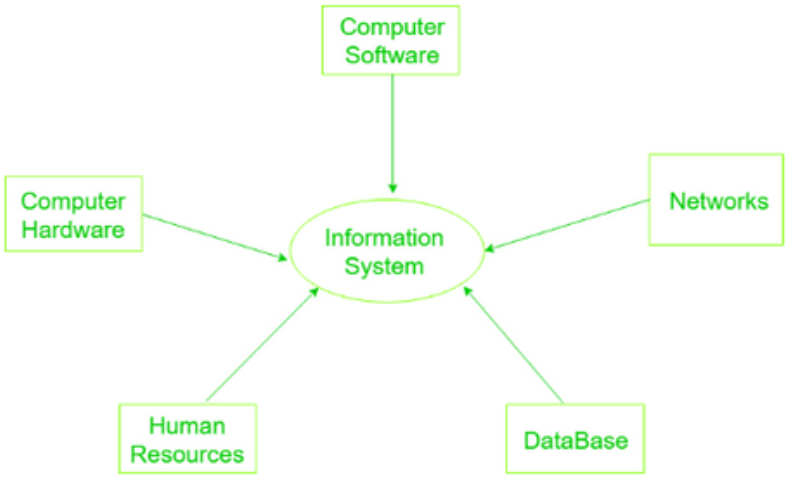
Unit 3

Information Technology- Components, Impact of IT on Society. Computers Hardware, Software. Storage Devices. Input/Output Devices, Telecommunication- Transmission media, Switching systems, Bandwidth. Multiplexing, Modulation, Protocols, Wireless Communication, Integrated Services Digital Network (ISDN), Open Systems Interconnection (OSI), Topologies, Types of Networks. Internet - Web browsers, WWW. Internet Protocols and Standards – HTTP, HTTPS, FTP, SMTP, TCP/IP, URI, URL. Hypertext, Hypermedia, Multimedia, Video conferencing, Web Page designing, Bar coding, Cloud Computing, Virtual Reality, Augmented Technologies. Standards for Library Automation. Barcode, RFID, NFC (Near Field Communication), QR Code, Biometric, Smartcard: Features and Applications.

INFORMATION TECHNOLOGY- COMPONENTS ,IMPACT OF IT ON SOCIETY

An Information system is a combination of hardware and software and telecommunication networks that people build to collect, create and distribute useful data, typically in an organization. It defines the flow of information within the system. The objective of an information system is to provide appropriate information to the user, to gather the data, process the data and communicate information to the user of the system.

COMPONENTS OF INFORMATION SYSTEM OR TECHNOLOGY



Components of the information system are as follows:

1. Computer Hardware:

Physical equipment used for input, output and processing. The hardware structure depends upon the type and size of the organization. It consists of an input and an output device, operating system, processor, and media devices. This also includes computer peripheral devices.

2. Computer Software:

The programs/ application program used to control and coordinate the hardware components. It is used for analysing and processing of the data. These programs include a set of instruction used for processing information.

Software is further classified into 3 types:

1. System Software
2. Application Software
3. Procedures

3. Databases:

Data are the raw facts and figures that are unorganized that are later processed to generate information. Softwares are used for organizing and serving data to the user, managing physical storage of media and virtual resources. As the hardware can't work without software the same as software needs data for processing. Data are managed using Database management system.

Database software is used for efficient access for required data, and to manage knowledge bases.

4. Network:

- Networks resources refer to the telecommunication networks like the intranet, extranet and the internet.
- These resources facilitate the flow of information in the organization.
- Networks consists of both the physical devices such as networks cards, routers, hubs and cables and software such as operating systems, web servers, data servers and application servers.
- Telecommunications networks consist of computers, communications processors, and other devices interconnected by communications media and controlled by software.
-

- Networks include communication media, and Network Support.

5. Human Resources:

It is associated with the manpower required to run and manage the system. People are the end user of the information system, end-user use information produced for their own purpose, the main purpose of the information system is to benefit the end user. The end user can be accountants, engineers, salespersons, customers, clerks, or managers etc. People are also responsible to develop and operate information systems. They include systems analysts, computer operators, programmers, and other clerical IS personnel, and managerial techniques.

Software:

1. **Library Management Systems (LMS):** Manage library collections, circulation, user accounts, and other core functions.
2. **Databases:** Provide access to scholarly journals, articles, reference materials, and other research resources.
3. **E-book platforms:** Host and lend digital books and audiobooks, offering flexible access options.
4. **Digital media tools:** Support creation, editing, and management of audio, video, and image content.
5. **Research databases:** Offer specialized subject-specific collections for in-depth research.
6. **Productivity software:** Word processors, spreadsheets, and presentation tools for staff and user tasks.
7. **Open-source software:** Freely available tools for specific library needs, providing cost-effective solutions.
8. **Learning management systems (LMS):** Deliver online courses, tutorials, and educational content.
9. **Social media management tools:** Engage with users, promote library services, and build online communities.
10. **Data analytics tools:** Analyze library usage, user behavior, and resource trends to improve decision-making.

Network Infrastructure:

1. **Local Area Networks (LANs):** Connect devices within a single building or location.
2. **Wide Area Networks (WANs):** Connect multiple LANs across geographically dispersed locations.
3. **Internet access:** Provides global connectivity for accessing online resources and services.
4. **Wireless networks:** Offer mobility and flexibility for users to access resources from anywhere within the library or beyond.
5. **Cloud computing:** Stores data and applications remotely, offering scalability and accessibility.
6. **Virtualization:** Creates multiple virtual machines on a single physical server, maximizing resource utilization.
7. **Network security measures:** Firewalls, intrusion detection systems, and encryption protect data from unauthorized access.
8. **Content Delivery Networks (CDNs):** Improve the speed and reliability of delivering online content to users.
9. **Network monitoring and maintenance:** Ensures smooth operation and performance of the network infrastructure.
10. **Emerging network technologies:** Software-Defined Networking (SDN) and 5G networks offer increased flexibility and efficiency.

Impact of IT on Libraries and Society:

Positive Impacts:

1. **Increased access to information:** Libraries can reach geographically dispersed users, offer 24/7 access, and overcome physical limitations.
2. **Improved discoverability of information:** Search engines and metadata tags within library systems enhance searching and retrieval of relevant resources.
3. **Personalized services:** User accounts and recommendation systems offer customized content and services based on individual needs and preferences.
4. **Collaboration and knowledge sharing:** Online communities, social media platforms, and digital repositories facilitate information exchange and knowledge creation.
5. **Preservation and digitization:** IT allows for digital archiving of cultural heritage materials, ensuring long-term access and preservation.
6. **Support for diverse learning styles:** Multimedia resources, interactive tools, and online learning platforms cater to varied learning needs and preferences.
7. **Community engagement:** Libraries use IT to connect with their communities, provide outreach services, and promote lifelong learning.

8. Economic development: Libraries contribute to economic growth by providing access to information and resources for entrepreneurs, businesses, and job seekers.
9. **Social inclusion:** IT bridges the digital divide and empowers marginalized communities by providing access to essential information and services.
10.**Global citizenship:** Libraries leverage IT to connect users with international resources and perspectives, fostering intercultural understanding.

COMPUTER GENERATIONS: KEY POINTS

1. First Generation (Vacuum Tubes)
- **Era:** 1940s-1950s
- **Key Technology:** Vacuum tubes
- **Examples:** ENIAC, UNIVAC 1, IBM 360, IBM 701
- **Characteristics:** Large, slow, unreliable, high power consumption

2. Second Generation (Transistors)
- **Era:** 1950s-1960s
- **Key Technology:** Transistors
- **Examples:** IBM 1401, TDC 12
- **Characteristics:** Smaller, faster, more reliable, lower power consumption
- **Improvements:** Magnetic core memory, magnetic disc storage, high-level languages

3. Third Generation (Integrated Circuits)
- **Era:** 1960s-1970s
- **Key Technology:** Integrated circuits (IC chips)
- **Examples:** TDC 316, TDC 332, IBM 370
- **Characteristics:** Even smaller, faster, more powerful, more memory
- **Improvements:** Increased use of high-level languages like FORTRAN IV and COBOL

4. Fourth Generation (Microprocessors)
- **Era:** 1970s-present
- **Key Technology:** Microprocessors
- **Examples:** Intel 8086, Intel 80486 DX2
- **Characteristics:** Extremely small, portable, powerful, affordable
- **Developments:** User-friendly interfaces, operating systems like UNIX, powerful languages like Java and C++, computer networks

5. Fifth Generation (Artificial Intelligence)
- **Era:** Emerging
- **Key Technology:** Artificial intelligence (AI)
- **Characteristics:** Natural language processing, pattern recognition, advanced user interfaces, powerful and compact computers
- **Potential:** More intuitive and interactive computing experiences, advancements in AI fields like robotics and medical diagnosis

COMPUTER CLASSIFICATION BY EFFICIENCY: KEY POINTS

Based on CPU speed, word length, memory, peripherals, software, and cost:
Microcomputers:
- **CPU:** Microprocessor chip
- **Word length:** 16-32 bits
- **Speed:** Up to 1 billion instructions per second (BIPS)
- **Memory:** Limited
- **Peripherals:** Typically a floppy disk drive
- **Software:** Limited operating systems and applications
- **Cost:** Affordable

Minicomputers:

- **CPU:** Single CPU with multiple terminals
- **Speed:** Comparable to microcomputers
- **Memory:** Up to 10 megabytes
- **Peripherals:** More diverse options
- **Software:** Supports multitasking and multi-user environments
- **Cost:** More expensive than microcomputers

Super Minicomputers:

- **CPU:** 32-bit CPU chips
- **Speed:** 1 million instructions per second
- **Memory:** 512 KB to 1 GB
- **Peripherals:** Similar to minicomputers
- **Software:** Wide range of high-level languages
- **Cost:** Higher than minicomputers

Mainframe Computers:

- **CPU:** 32-48-64 bit CPU chips
- **Speed:** Up to 10 million instructions per second
- **Memory:** 1 megabyte to 16 GB
- **Peripherals:** Extensive network capabilities
- **Software:** Robust operating systems and specialized applications
- **Cost:** Very expensive

Supercomputers:

- **CPU:** 64-bit word length chips
- **Speed:** Several billion operations per second
- **Memory:** Several gigabytes
- **Peripherals:** High-performance network connections
- **Software:** Specialized scientific and engineering applications
- **Cost:** Extremely expensive

Computer Functional Units: Key Points

Main components:

- **Central Processing Unit (CPU):** Performs calculations and controls other components.
- **Memory:** Stores data and instructions temporarily (RAM) or permanently (ROM).
- **Input devices:** Allow users to enter data into the computer (keyboard, mouse, etc.).
- **Output devices:** Display information (monitor, printer, etc.).
- **Storage devices:** Store data and programs permanently (hard drive, SSD, etc.).

CPU components:

- **Motherboard:** Houses all other components and provides connections.
- **CPU:** Main processing unit performs calculations and logic operations.
- **RAM:** Holds data and instructions needed for current tasks.
- **ROM:** Stores essential system programs and settings.
- **BIOS:** Basic Input/Output System, initializes hardware and loads operating system.
- **Chipsets:** Control data flow between CPU and other components.
- **Buses:** Pathways for data transfer between components.
- **Expansion slots:** Allow adding additional hardware.

Other components:

- **Drives:** Store data and programs (hard disk, CD/DVD-ROM, etc.).
- **Expansion cards:** Enhance functionality (graphics card, network card, etc.).
- **Peripherals:** Connect to the computer for input, output, or communication.

COMPUTER DRIVES: KEY POINTS

Types of Drives:

- **Hard Disk Drive (HDD):**Internal, magnetic storage
- Fast read/write speeds
- Large capacity (gigabytes to terabytes)
- Sensitive to shock and vibration
- **Compact Disc Drive (CD Drive):**Two types: CD-ROM (read-only) and CD-RW (read/write)
- Stores up to 700 MB
- Primarily used for music and software installation
- **Digital Versatile Disc Drive (DVD Drive):**Two types: DVD-ROM (read-only) and DVD-RAM (read/write)
- Stores up to 4.7 GB per side
- Used for movies, games, and large data files
- **USB Flash Drive:**Solid-state storage using flash memory
- Small, portable, and durable
- High capacity (gigabytes to terabytes)
- Susceptible to loss or damage

Additional Notes:

- Each drive type has its own strengths and weaknesses depending on your needs.
- Newer technologies like Solid State Drives (SSDs) offer faster speeds and higher reliability than HDDs.
- Optical drives (CD/DVD) are being replaced by other storage solutions in some cases.
- Choose the right drive based on capacity, speed, portability, and cost considerations.

COMPUTER PERIPHERALS: KEY POINTS

Purpose: Peripherals expand a computer's functionality and user interaction.

Common Peripherals:

- **Keyboard:** Typing input device, various layouts available.
- **Mouse:** Pointing device for navigating and selecting.
- **Monitor:** Visual output device, CRTs being replaced by LCDs.
- **Printer:** Creates physical copies of digital information.Types: Dot matrix, inkjet, laser, plotters, thermal.
- **Modem:** Connects to networks, modulates digital signals for transmission.
- **Scanner:** Converts physical images and documents into digital format.Types: Flatbed, sheet-fed, handheld, drum.
- **Cards:** Enhance capabilities by adding features.Examples: Sound card, network card, video card.

COMPUTER HARDWARE SECTIONS: KEY POINTS

Main Sections:

- **Input:** Devices for entering data and instructions into the computer.
- **Output:** Devices for displaying or transmitting processed information.
- **Processing:** Components that perform calculations and control other hardware.

Input Devices:

- Keyboard: Primary typing device for text input.
- Mouse: Pointing device for navigation and selection.
- Other Input Devices: Scanner, microphone, barcode reader, OCR reader, etc.

Output Devices:

- Monitor: Visual display for information and graphics.
- Printer: Creates physical copies of digital documents.
- Other Output Devices: Speakers, projector, plotter, etc.

Processing Components:

- Central Processing Unit (CPU): Main processing unit that performs calculations and instructions.
- Memory (RAM): Stores data and instructions temporarily for quick access.
- Storage Devices (HDD, SSD): Store data and programs permanently.
- Other Processing Components: Motherboard, graphics card, sound card, etc

COMPUTER PROCESSOR: KEY POINTS

Central Processing Unit (CPU): The brain of the computer, responsible for processing instructions and controlling other components.

Main components:

- **Control Unit:** Coordinates and manages operations between ALU and memory.
- **Arithmetic Logic Unit (ALU):** Performs calculations and logic operations.
- **Memory Unit:** Stores data and instructions temporarily during execution.

Memory types:

- **Primary Memory (RAM):** Volatile, fast, used for active tasks.
- **Secondary Memory (HDD, SSD):** Non-volatile, larger capacity, for permanent storage.

NEED AND PURPOSE OF ICT IN LIBRARIES: KEY POINTS

Need and Purpose of ICT in Libraries: Key Points

Benefits:

- **Increased efficiency and productivity:** Automates tasks, frees up staff for user-oriented services.
- **Improved service quality:** Ensures accuracy, speed, and ease of use for information access.
- **Better management of resources:** Optimizes physical and financial resource allocation.
- **Wider access to information:** Provides remote access to library resources and online databases.
- **Information dissemination:** Enables libraries to share their resources and services more broadly.
- **Resource sharing and communication:** Facilitates collaboration with other libraries.

Applications:

- **Collection management:** Acquiring, storing, and organizing digital information.
- **Information processing and retrieval:** Using metadata and technology for efficient searching.
- **Information services:** Offering online databases, reference services, and user education.

STORAGE DEVICES ,INPUT/OUTPUT DEVICES

Storage Devices	Input Devices	Output Devices
1. Hard Disk Drive (HDD)	1. Keyboard	1. Monitor
2. Solid State Drive (SSD)	2. Mouse	2. Printer
3. USB Flash Drive	3. Touchscreen	3. Speaker
4. Memory Card	4. Graphics Tablet	4. Projector
5. External Hard Drive	5. Scanner	5. Headphones
6. Optical Disc Drive	6. Microphone	6. Plotter
7. Magnetic Tape Drive	7. Webcam	7. Braille Display
8. Network Attached Storage (NAS)	8. Joystick/Gamepad	8. Haptic Feedback Devices
9. Cloud Storage	9. Barcode Reader	9. Smartboard
10. RAID	10. Touchpad	10. Digital Signage Display

TELECOMMUNICATION- TRANSMISSION MEDIA, SWITCHING SYSTEMS, BANDWIDTH

Transmission Media:

- **Physical channels through which data is transmitted:**
  - **Wired:** Copper wires, coaxial cables, fiber optic cables.
  - **Wireless:** Radio waves, microwaves, satellites.
- **Each medium has its own characteristics:**
  - **Bandwidth (capacity):** Amount of data transferable per second (bps, Mbps, Gbps).
  - **Transmission speed:** How quickly data moves through the medium.
  - **Distance:** Maximum distance data can travel effectively.
  - **Cost:** Installation and maintenance expense.
  - **Security:** Susceptibility to interference or unauthorized access.

Switching Systems:

Switching systems are fundamental components in networking and telecommunications that enable the routing and forwarding of data packets from one point to another. They are responsible for making decisions about how data should be transmitted within a network. Here's a simple explanation with examples:

Switching Systems:

Switching systems manage the flow of data within a network by directing data packets from their source to their destination. There are primarily three types of switching systems:

1. **Circuit Switching:**
   - In circuit switching, a dedicated communication path is established between two nodes before the actual data transfer occurs.
   - Example: Traditional telephone networks use circuit switching. When you make a call, a physical circuit is established between your phone and the recipient's phone, and this circuit remains dedicated for the duration of the call.
2. **Packet Switching:**
   - In packet switching, data is divided into packets, each with its own header containing routing information. These packets are then individually routed through the network to their destination.
   - Example: The Internet predominantly relies on packet switching. When you send an email or browse a website, the data is broken into packets that travel independently through various routers to reach the destination. Each packet can take a different route and be reassembled at the destination.
3. **Message Switching:**
   - In message switching, the entire message is stored and forwarded as a whole. Intermediate nodes store the message until the next available link is free, and then forward it.
   - Example: Early forms of email used message switching. When you send an email, it's stored in the email server's queue until it can be forwarded to the recipient's email server. The entire message is delivered intact.

Examples

Circuit Switching:

1. Public Switched Telephone Network (PSTN)
2. Traditional landline telephone systems
3. ISDN (Integrated Services Digital Network)
4. Legacy telegraph systems
5. Circuit-switched networks for video conferencing
6. Dial-up modem connections
7. Dedicated leased lines for businesses
8. Voice over Circuit-Switched Networks (VoCSN)
9. Legacy telephony systems in rural areas
10. Emergency phone systems (e.g., 911 in the United States)

Packet Switching:

- Internet Protocol (IP) networks
- Ethernet-based LANs (Local Area Networks)
- Wi-Fi networks (using protocols like TCP/IP)
- Virtual Private Networks (VPNs)
- Voice over Internet Protocol (VoIP)
- Internet-based video streaming services (e.g., Netflix)
- Online gaming networks
- Cloud computing platforms
- Mobile data networks (e.g., 4G LTE, 5G)
- Satellite internet services

Message Switching:

- Early email systems (e.g., ARPANET Mail)
- Store-and-forward messaging services
- Telex networks
- Fax machines (where messages are stored and transmitted)
- Bulletin Board Systems (BBS)
- Early forms of instant messaging systems
- Government communication networks for secure messaging
- Voice messaging systems (storing and forwarding voicemails)
- Delay-tolerant networks (DTNs) in remote or space-based communication
- Automated notification systems for alerts and updates (e.g., weather alerts, stock notifications)

Bandwidth:

Bandwidth is a crucial factor in determining the speed of data transmission in a network. It refers to the maximum amount of data that can be transmitted over a communication channel within a given period, typically measured in bits per second (bps), kilobits per second (kbps), megabits per second (Mbps), or gigabits per second (Gbps).

- **Crucial Factor in Determining Data Transmission Speed:**
  - Bandwidth plays a significant role in determining how quickly data can be transmitted from one point to another in a network. A higher bandwidth generally allows for faster data transfer rates.
- **Bandwidth Requirements Vary Depending on Application:**
  - Different applications have varying bandwidth requirements based on the type and volume of data being transmitted.
    - For example, voice calls typically require lower bandwidth, often around 64 kilobits per second (kbps), to maintain clear communication.
    - Video streaming, especially in standard definition, requires higher bandwidth, often several megabits per second (Mbps), to deliver smooth playback without buffering.
    - High-definition video streaming demands even higher bandwidth, sometimes tens of megabits per second, to support the transmission of larger, higher-quality video files.
- **Bandwidth Allocation:**
  - Bandwidth can be allocated in different ways based on the needs of users and applications.
    - **Shared Bandwidth:** In shared bandwidth systems, the available bandwidth is distributed among multiple users or applications on the same communication medium. This means that the total available bandwidth is shared among all users, which can lead to congestion and slower speeds during peak usage times.
    - **Dedicated Bandwidth:** Dedicated bandwidth is reserved for a specific user or application, ensuring that the allocated bandwidth is exclusively available for their use. This approach guarantees consistent performance and prevents contention for bandwidth resources.

Bandwidth:

- **Crucial factor in determining data transmission speed:**
  - **Higher bandwidth allows faster data transfer.**
  - **Bandwidth requirements vary depending on application:**
    - **Voice calls:** Requires lower bandwidth (e.g., 64 kbps).
    - **Video streaming:** Requires higher bandwidth (e.g., several Mbps).
    - **High-definition video:** Requires even higher bandwidth (e.g., tens of Mbps).
- **Bandwidth allocation:**
  - **Shared bandwidth:** Distributed among multiple users on the same medium.
  - **Dedicated bandwidth:** Reserved for a specific user or application.

MULTIPLEXING, MODULATION, PROTOCOLS

Multiplexing, Modulation, Protocols: Key Points

Multiplexing:

- Combining multiple signals onto a single channel for transmission.
- Improves resource utilization and transmission efficiency.
  - Types:**Frequency Division Multiplexing (FDM):** Divides channel into frequency bands for different signals. (AM radio)
  - **Time Division Multiplexing (TDM):** Allocates time slots on the channel for each signal. (Telephone circuits)
  - **Wavelength Division Multiplexing (WDM):** Uses different wavelengths of light for different signals. (Fiber optic cables)
  - **Code Division Multiplexing (CDM):** Assigns unique codes to signals, allowing them to share the channel simultaneously. (Cellular networks)

Modulation:

- Process of encoding information onto a carrier signal for transmission.
- Enables information to be transmitted over different media.
  - Types:
  - **Amplitude Modulation (AM):** Varies amplitude of carrier signal based on information signal. (Early radio)
  - **Frequency Modulation (FM):** Varies frequency of carrier signal based on information signal. (Modern radio)
  - **Phase Modulation (PM):** Varies phase of carrier signal based on information signal. (Satellite communication)
  - **Digital Modulation:** Represents information as digital bits and modulates carrier signal accordingly. (Digital communication)

Protocols:

- Set of rules and standards that govern communication between devices on a network.
- Ensure smooth data exchange and compatibility.
  - Examples:**TCP/IP:** Suite of protocols that underpin the internet.
  - **HTTP:** Protocol for transferring web pages.
  - **Wi-Fi:** Protocol for wireless data transmission.
  - **Bluetooth:** Protocol for short-range wireless communication.

Common Examples of Protocols:

- TCP/IP (Transmission Control Protocol/Internet Protocol): The foundation of internet communication, TCP guarantees reliable data delivery by breaking it into packets, sequencing them, and acknowledging receipt. IP handles addressing and routing packets across the network.
- HTTP (Hypertext Transfer Protocol): This is the language of the web, governing how web browsers request and receive web pages and other resources from servers.
- FTP (File Transfer Protocol): Used for transferring files between computers, FTP defines how files are uploaded, downloaded, and managed on remote servers.

- SMTP (Simple Mail Transfer Protocol): The workhorse behind email, SMTP dictates how email messages are sent and received between mail servers.
- Wi-Fi (Wireless Fidelity): Enables wireless networking access, defining how devices connect to Wi-Fi networks and communicate with each other.
- Bluetooth: Another wireless communication protocol, primarily used for short-range data transfer between devices like smartphones and wearables.

Physical Layer Protocols:

- Define the physical characteristics of the transmission medium (e.g., cables, wireless signals).
- Examples:
  - **Ethernet:** Various versions exist, from 10 Mbps (10Base-T) to 10 Gbps (10 Gigabit Ethernet) and beyond.
  - **Wi-Fi:** Evolves with versions like 802.11g, 802.11n, 802.11ac (Wi-Fi 5), and the latest 802.11ax (Wi-Fi 6), offering increased speed and capacity.
  - **Bluetooth:** Versions range from 1.0 to 5.3, with each improvement focusing on lower energy consumption, faster data transfer, and extended range.

Data Link Layer Protocols:

- Ensure reliable data transmission between devices on the same network segment.
- Examples:
  - **Point-to-Point Protocol (PPP):** Commonly used for dial-up connections and basic internet access.
  - **Ethernet:** Also operates at the data link layer, defining frame format, addressing, and error correction mechanisms.
  - **High-Level Data Link Control (HDLC):** Used in various applications like frame relay and satellite communication.

Network Layer Protocols:

- Handle routing and addressing, enabling data packets to travel across different networks to reach their destination.
- Examples:
  - **Internet Protocol (IP):** The cornerstone of internet communication, with versions IPv4 and IPv6. IPv4 uses 32-bit addresses, while IPv6 offers significantly more addresses with its 128-bit structure.
  - **Address Resolution Protocol (ARP):** Translates IP addresses to hardware addresses (MAC addresses) for packet delivery.
  - **Open Shortest Path First (OSPF):** Routing protocol that dynamically calculates the best path for data packets within a network domain.

Transport Layer Protocols:

- Provide reliable data transfer between applications on different devices.
- Examples:
  - **Transmission Control Protocol (TCP):** Guarantees reliable data delivery by sequencing packets, acknowledging receipt, and retransmitting lost data.
  - **User Datagram Protocol (UDP):** Offers connectionless communication suited for time-sensitive applications like streaming media, where order and reliability are less crucial than speed.

Application Layer Protocols:

- Define how applications interact with the network and each other.
- Examples:
  - **Hypertext Transfer Protocol (HTTP):** The foundation of web browsing, allowing communication between web browsers and servers.
  - **File Transfer Protocol (FTP):** Used for uploading and downloading files between computers.
  - **Simple Mail Transfer Protocol (SMTP):** Responsible for sending and receiving email messages.
  - **Domain Name System (DNS):** Translates human-readable domain names (e.g., [invalid URL removed]) into machine-readable IP addresses.

Interdependence:

- These concepts work together to enable communication:
- **Multiplexing:** Combines signals efficiently.
- **Modulation:** Encodes information for transmission.
- **Protocols:** Define how devices communicate.

WIRELESS COMMUNICATION, INTEGRATED SERVICES DIGITAL NETWORK (ISDN)

Wireless Communication:

Wireless communication refers to the transmission of data between devices without using physical cables. It has revolutionized modern communication, offering mobility, flexibility, and convenience. Let's explore some key types:

Cellular Networks:

- Utilize a network of cell towers to transmit data and voice calls.
- Technologies:
  - **2G:** First widely adopted cellular network, primarily for voice calls.
  - **3G:** Introduced faster data speeds and mobile internet access.
  - **4G:** Significantly boosted data speeds and enabled streaming and advanced applications.
  - **5G:** Current leading technology, offering ultra-fast speeds, low latency, and support for many connected devices.

Wi-Fi:

- Provides wireless networking access within a limited area (local area network, LAN).
- Utilizes radio waves to connect devices to a router or access point.
- Versions:
  - **802.11g:** Early standard with speeds up to 54 Mbps.
  - **802.11n:** Increased speed to 300 Mbps and introduced multiple-input, multiple-output (MIMO) technology.
  - **802.11ac (Wi-Fi 5):** Boosted speeds to 3.46 Gbps with improved range and capacity.
  - **802.11ax (Wi-Fi 6):** Latest standard, offering even higher speeds (9.6 Gbps), better efficiency, and enhanced performance in crowded environments.

Bluetooth:

- Short-range wireless technology for data transfer between devices like smartphones, wearables, and speakers.
- Versions:
  - **1.0:** Low speed and limited range.
  - **2.0+:** Improved speed, range, and security.
  - **5.0 and 5.1:** Significantly enhanced speed, range, and power efficiency.

Satellite Communication:

- Uses satellites orbiting Earth to transmit data over long distances.
- Applications include internet access in remote areas, GPS navigation, and satellite TV.

Benefits of Wireless Communication:

- Mobility and freedom from cables
- Increased accessibility and reach
- Convenience and flexibility
- Support for new technologies and applications

Challenges of Wireless Communication:

- Security vulnerabilities and potential for interference
- Limited range and bandwidth compared to wired networks
- Higher energy consumption
- Cost implications for infrastructure and devices

ISDN: A Legacy Technology in the Digital Age

What was it?

Integrated Services Digital Network (ISDN) was a digital communication technology that aimed to revolutionize telecommunications in the 1980s and 1990s. It offered a significant upgrade over analog phone lines by:

- **Simultaneously transmitting voice, data, and video:** Imagine making a phone call while downloading a file or participating in a video conference, all on a single line.
- **Providing digital quality:** Gone were the crackles and pops of analog, replaced by crisp, clear audio and data transmission.
- **Increasing speed:** Compared to dial-up internet, ISDN offered blazing-fast speeds, especially with Primary Rate Interface (PRI).
- **Enhancing security:** Digital encryption provided a layer of protection against eavesdropping and interference.

Types of ISDN:

- **Basic Rate Interface (BRI):** Two 64 kbps data channels and one 16 kbps signaling channel, ideal for homes and small businesses.
- **Primary Rate Interface (PRI):** 23 64 kbps data channels and one 64 kbps signaling channel, catering to larger organizations with high bandwidth needs.

Benefits and Challenges:

Benefits:

- **Improved communication experience:** Simultaneous voice and data, digital quality, and faster speeds made communication more efficient and enjoyable.
- **Increased productivity:** Businesses could benefit from faster data transfer and improved collaboration capabilities.
- **Early adopter advantage:** For a time, ISDN offered a competitive edge to those who embraced the technology.

Challenges:

- **Limited availability:** ISDN service providers became less common as newer technologies emerged.
- **High cost:** Compared to analog lines and early internet options, ISDN was generally more expensive.
- **Technical complexity:** Setting up and using ISDN required more technical expertise than traditional phone lines.

Current Status:

While ISDN played a crucial role in the evolution of digital communication, its limitations and the emergence of faster, more accessible technologies have led to its decline. Today, ISDN is largely obsolete, replaced by:

- **Broadband internet:** Offering significantly faster speeds and wider availability.
- **Cellular networks:** Enabling mobile data access and communication on the go.
- **Voice over IP (VoIP):** Delivering voice calls through internet connections, often with added features and lower costs.

Open Systems Interconnection (OSI),

Open Systems Interconnection (OSI) Model: A Deep Dive

The Open Systems Interconnection (OSI) model, developed by the International Organization for Standardization (ISO), serves as a conceptual framework for understanding network communication. It divides the communication process into seven distinct layers, each with its own set of protocols and functionalities. Here's a deeper exploration of the OSI model:

Layers of the OSI Model:

1. **Physical Layer:** Deals with the physical transmission of data bits over the network medium (e.g., cables, wireless signals). Protocols like Ethernet, Wi-Fi, and Bluetooth operate at this layer.
2. **Data Link Layer:** Handles reliable data transfer between adjacent network devices. Tasks include error detection and correction, addressing, and flow control. Examples include Point-to-Point Protocol (PPP) and Ethernet.
3. **Network Layer:** Responsible for routing and addressing data packets across networks, ensuring they reach their intended destination. The core protocol here is the Internet Protocol (IP), with versions IPv4 and IPv6.

- **Transport Layer:** Provides reliable data transfer between applications on different devices. Key protocols include Transmission Control Protocol (TCP) for reliable delivery and User Datagram Protocol (UDP) for faster, connectionless communication.
- **Session Layer:** Establishes, manages, and terminates sessions between communicating applications. It ensures data integrity and synchronizes communication flow.
- **Presentation Layer:** Handles data formatting and encryption/decryption, ensuring compatibility between different systems. It adapts data to the specific needs of the application layer.
- **Application Layer:** Provides network services to applications like web browsing (HTTP), file transfer (FTP), email (SMTP), and remote access.

Benefits of the OSI Model:

- **Standardization:** Facilitates communication between diverse network devices and software regardless of their specific implementations.
- **Modular design:** Enables independent development and improvement of individual layers without affecting the entire system.
- **Troubleshooting:** Helps identify issues at specific layers, making network troubleshooting more efficient.
- **Education:** Provides a clear framework for understanding the complexities of network communication.

Limitations of the OSI Model:

- **Theoretical:** Not always directly implemented in real-world networks, which may combine or collapse some layers.
- **Complexity:** Can be overwhelming for beginners due to its seven layers and numerous protocols.
- **Limited focus on security:** Security considerations are not explicitly addressed in each layer, requiring additional security measures.

Network Topology

1. Bus Topology:

- In a bus topology, all devices are connected to a central cable called the bus.
- **Advantages:**
  - Simple and inexpensive to implement.
  - Easy to add or remove devices without disrupting the network.
- **Disadvantages:**
  - Single point of failure: If the main cable fails, the entire network can go down.
  - Limited scalability: Adding too many devices can degrade performance.

2. Star Topology:

- In a star topology, all devices are connected to a central hub or switch.
- **Advantages:**
  - Centralized management: Easy to monitor and troubleshoot network connections.
  - Scalability: Additional devices can be added without affecting the rest of the network.
- **Disadvantages:**
  - Dependency on central device: If the central hub or switch fails, all connected devices lose connectivity.
  - Cost: Requires more cabling and equipment compared to bus topology.

3. Ring Topology:

- In a ring topology, each device is connected to two neighboring devices, forming a closed loop.
- **Advantages:**
  - Equal access to resources: Each device has the same access to the network.
  - Efficient data transmission: Data travels in one direction around the ring, reducing collisions.
- **Disadvantages:**
  - Single point of failure: If one device or connection fails, the entire network can be affected.
  - Limited scalability: Adding or removing devices can disrupt the entire network.

4.Mesh Topology:

- **In a mesh topology, every device is connected to every other device in the network.**
- **Advantages:**
  - **Fault tolerance: Redundant connections ensure network reliability and resilience.**
  - **High performance: Multiple paths for data transmission can improve network efficiency.**

Disadvantages:

- Complexity: Requires careful planning and management of connections.
- Cost: High implementation and maintenance costs due to extensive cabling and equipment requirements.

5. Hybrid Topology:

A hybrid topology combines two or more different network topologies (e.g., star-bus, star-ring).

Advantages:

Offers flexibility to meet specific network requirements.

Provides redundancy and fault tolerance by leveraging multiple topology types.

Disadvantages:

Complexity: Requires careful planning and configuration to integrate different topologies.

Higher cost: Implementation and maintenance expenses may increase due to the combination of various topology types.

6. Tree Topology:

Also known as hierarchical topology, a tree topology combines characteristics of bus and star topologies.

Advantages:

Scalability: Suitable for large networks with multiple subnetworks.

Centralized management: Offers a hierarchical structure for efficient network management.

Disadvantages:

Dependency on root node: Failure of the root node can disrupt the entire network.

Limited flexibility: Adding or removing levels/subnetworks can be challenging.

7. Mesh Topology (Partial Mesh):

A partial mesh topology is a variation of the mesh topology where not all devices are directly connected to every other device.

Advantages:

Provides some degree of fault tolerance and redundancy.

Offers a balance between complexity and reliability compared to a full mesh topology.

Disadvantages:

Reduced fault tolerance: Failure of critical links can still impact network connectivity.

May not offer the same level of redundancy as a full mesh topology.

8. Point-to-Point Topology:

In a point-to-point topology, each device is directly connected to another single device.

Advantages:

Simplest topology: Easy to set up and maintain.

Efficient data transmission: Direct connections minimize latency and interference.

Disadvantages:

Limited scalability: Adding more devices requires additional point-to-point connections.

Lack of redundancy: Single points of failure can disrupt network connectivity

Types of Networks: Exploring Connectivity Options

Networks connect devices and computers, allowing them to share resources and information. Understanding different network types is crucial for choosing the right solution for your needs. Let's delve into various network classifications:

By Geographical Scope:

- **Personal Area Network (PAN):** Small, short-range networks connecting devices within close proximity, like Bluetooth for headphones or USB for data transfer.
- **Local Area Network (LAN):** Covers a limited area like a home, office, or building, connecting devices using wired (Ethernet) or wireless (Wi-Fi) technologies.
- **Campus Area Network (CAN):** Spans a larger area like a university campus or business park, connecting multiple LANs within a defined geographical boundary.
- **Metropolitan Area Network (MAN):** Covers a city or metropolitan area, connecting multiple LANs or CANs across a wider geographical region.
- **Wide Area Network (WAN):** Covers large geographical distances, connecting LANs, MANs, and other networks across countries or continents, often utilizing public infrastructure like the internet.

By Purpose:

- **Private Network:** Owned and operated by a single entity for internal use, offering control and security within an organization.
- **Public Network:** Accessible to anyone, like the internet, providing open access to information and resources.
- **Community Network:** Built and operated by a community group to offer internet access and other services within a specific area.
- **Storage Area Network (SAN):** Dedicated high-speed network for connecting storage devices to servers, optimizing data access and storage management.
- **Virtual Private Network (VPN):** Creates a secure tunnel over a public network like the internet, allowing remote users to connect to a private network securely.

By Technology:

- **Wired Networks:** Utilize cables like Ethernet or fiber optic for data transmission, offering high speeds and reliability but limited mobility.
- **Wireless Networks:** Employ radio waves or microwaves (Wi-Fi, Bluetooth) for data transmission, providing flexibility and mobility but potentially lower speeds and security concerns.
- **Peer-to-Peer (P2P) Networks:** Devices directly connect and share resources without a central server, often used for file sharing or distributed computing.
- **Client-Server Networks:** Devices connect to a central server that provides resources and services, offering centralized management and control.

Additional Considerations:

- **Network Topology:** The physical or logical arrangement of devices in a network (e.g., star, mesh, bus).
- **Network Security:** Measures taken to protect data and resources from unauthorized access and threats.
- **Network Performance:** Factors like speed, bandwidth, latency, and reliability.
- **Scalability:** The ability of a network to adapt and grow as needs evolve.

INTERNET - WEB BROWSERS

Word: Internet

The Internet consists of technologies developed by different individuals and organizations. Important figures include Robert W. Taylor, who led the development of the ARPANET (an early prototype of the Internet), and Vinton Cerf and Robert Kahn, who developed the Transmission Control Protocol/Internet Protocol (TCP/IP) technologies.

Web Browsers:

- **Definition:** Software applications used to access and interact with websites on the internet.
- **Function:**
  - Fetch and display web pages.

- **Follow hyperlinks to navigate between pages.**
- **Interact with web forms and applications.**
- **Manage user preferences and settings.**

Early Web Browsers:

- **Nexus (1989):** First graphical web browser, but not widely used.
- **Mosaic (1993):** Popularized the graphical web browser concept.

Netscape Navigator:

- Released in 1994.
- Dominated the browser market in the mid-1990s.
- Known for its speed, ease of use, and innovative features.
- Lost market share to Internet Explorer in the late 1990s.
- Discontinued in 2008.

Before the Dawn of Browsers:

Imagine computers not as graphical interfaces but as text-based systems, requiring complex commands to perform even basic tasks. This was the reality before web browsers emerged in the early 1990s, forever changing how we interact with computers.

The Pioneering Years:

- **1990:** Tim Berners-Lee at CERN develops the first web browser, **WorldWideWeb**, offering a user-friendly interface for navigating the nascent web.
- **1993:** NCSA releases **Mosaic**, the first graphical browser, showcasing multimedia capabilities and sparking widespread interest.
- **1994:** Netscape Navigator, founded by Andreessen, quickly gains popularity as the first commercially available web browser.

The Browser Wars:

- **1995:** Microsoft enters the scene with **Internet Explorer**, igniting the "browser wars" for market dominance.
- **1996:** Opera Software introduces its browser, known for its advanced features and customization options.
- **1998:** Netscape opens its source code, leading to the creation of the Mozilla project, which later evolves into the popular **Firefox** browser.

Evolution and Diversification:

- **2003:** Apple launches **Safari**, specifically designed for its Mac devices, later becoming available for Windows and offering a mobile version.
- **2008:** Google enters the game with **Chrome**, quickly gaining popularity for its speed, performance, and intuitive interface. It remains the most used browser today.
- **2015:** Internet Explorer is rebranded as **Microsoft Edge**, pre-installed on Windows devices.
- **Present Day:** New players like Brave and Vivaldi emerge, offering unique features and attracting niche user groups.

WWW

Birth of an Idea:

- Tim Berners-Lee, motivated by document management woes at CERN, envisioned a new system.
- He rejected hierarchical and keyword-based approaches, inspired by hypertext concepts.
- His system allowed linking across databases, supported multiple user access, and aimed for multimedia capabilities.
- Decentralization and open access were core principles.

From Prototype to Public Launch:

- Berners-Lee's proposal and implementation materialized in 1990 with the "WorldWideWeb" browser and server.
- Early 1991 saw limited release to research institutions, followed by global public access in August.
- CERN's royalty-free offering in 1993 fueled rapid growth.

Mosaic and Netscape: Catalysts for Popularity:

- NCSA's Mosaic browser, released in 1993, brought user-friendly graphics and forms support.
- Netscape Navigator, launched in 1994, introduced Java and JavaScript, further propelling web adoption.
- Netscape's IPO in 1995 triggered the dot-com bubble and browser wars.

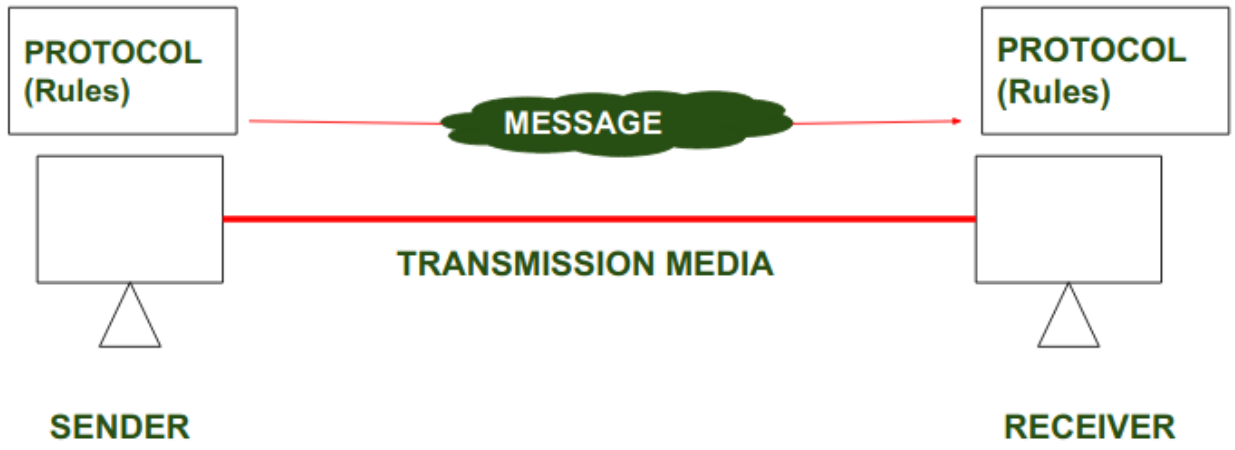
Microsoft Enters, Standards Evolve:

- Microsoft's Internet Explorer, bundled with Windows, dominated for over a decade.
- W3C, founded by Berners-Lee, standardized web technologies, pushing for stricter XHTML.
- Developers, utilizing Ajax, ushered in the Web 2.0 era, defying XHTML constraints.
- Mozilla, Opera, and Apple formed WHATWG, developing HTML5 as the future standard.

INTERNET PROTOCOLS AND STANDARDS

Computer networks are dependent on protocols and standards which plays a vital role, which enables communication between different devices and systems with one another and share data seamlessly. Network protocol ensures that different technologies and components of the network are compatible with one another, reliable, and able to function together

WORKING OF INTERNET PROTOCOLS



In Order to make communication successful between devices , some rules and procedures should be agreed upon at the sending and receiving ends of the system. Such rules and procedures are called as Protocols . Different types of protocols are used for different types of communication.

Types of Protocol

- Network Layer Protocols : Network layer protocols operate in the network layer which is also known as the Layer 3 of the network architecture. Network layer protocols are responsible for packet routing, forwarding and addressing of data packets throughout the network . IP and ICMP are the network layer protocols.
- Transport layer Protocols : Transport layer protocols works in transport layer which provides end-to-end service ensuring data transfer across apps on different devices. TCP and UDP are the most popular transport layer protocols.
- Application Layer Protocol : Application layer protocol working in the application layer of the network architecture provides communication between applications running on different devices. The application layer protocols enable cross-device communication. They format, exchange, and interpret application data. HTTP, FTP, and SMTP are examples.
- Wireless Protocols : Wireless protocols basically used in wireless communication which enables data transfer through wireless networks. Bluetooth, Wi-Fi, and LTE protocols are examples.
- Routing Protocols : Routing protocol establishes the best/optimal network pathways throughout the network for fastest data transmission. Routers share information to develop and maintain routing tables. RIP, OSPF, and BGP are examples.

- Security Protocols : security protocol protects data confidentiality, integrity, and authenticity while transmission of data over the network. They include SSL and TLS, encryption methods, and authentication protocols for providing data security.
- Internet Protocols : IP identifies devices uniquely. Internet protocol provides data communication through routing and forwarding data packets from one device to another by unique addressing scheme.

HTTP, HTTPS, FTP, SMTP, TCP/IP, URI, URL

1. HTTP (Hypertext Transfer Protocol): Year - 1989, Founder - Tim Berners-Lee

- **Function:** Defines how web browsers and servers communicate to transfer data like web pages, images, and videos.
- **Keypoint:** Forms the foundation of web communication, responsible for requesting and receiving resources.

2. HTTPS (Hypertext Transfer Protocol Secure): Year - 1996, Founder - Netscape Communications

- **Function:** Secure version of HTTP, encrypts data transmission for secure online interactions.
- **Keypoint:** Crucial for protecting confidential information like passwords and credit card details.

3. FTP (File Transfer Protocol): Year - 1971, Founder - Abhay Bhushan

- **Function:** Enables transfer of files between computers over a network.
- **Keypoint:** Used for uploading and downloading files, often employed for large file transfers.

4. SMTP (Simple Mail Transfer Protocol): Year - 1982, Founder - RFC 821 Working Group

- **Function:** Responsible for sending and receiving email messages between servers.
- **Keypoint:** The backbone of email communication, ensuring messages reach their intended recipients.

5. TCP/IP (Transmission Control Protocol/Internet Protocol): Year - 1974, Vint Cerf and Robert Kahn

- **Function:** Suite of protocols forming the core communication language of the internet.
- **Keypoint:** Breaks data into packets, ensures reliable transmission, and routes data across networks.

6. URI (Uniform Resource Identifier): Year - 1994, Tim Berners-Lee

- **Function:** Identifies a resource on the internet, including web pages, files, and email addresses.
- **Keypoint:** Acts as a unique address for locating specific resources online.

7. URL (Uniform Resource Locator): Year - 1994, Tim Berners-Lee

- **Function:** Subtype of URI specifically used for locating web pages and resources on the internet.
- **Keypoint:** Familiar format we see in address bars (e.g., https://www.example.com).

HYPERTEXT, HYPERMEDIA, MULTIMEDIA

Hypertext, Hypermedia, Multimedia: A Navigational Evolution

1. Hypertext:

- **Year:** 1965
- **Founder:** Ted Nelson
- **Function:** Links words or phrases to other related information within a digital document.
- **Keypoint:** Provides non-linear reading experience, encouraging exploration and connection building.
- **Example:** Clicking on a highlighted word in an article to be directed to its definition.

2. Hypermedia:

- **Year:** 1980s
- **Founder:** Multiple contributors
- **Function:** Expands upon hypertext by including various media formats like images, audio, and video, creating richer interactive experiences.
- **Keypoint:** Offers deeper engagement and understanding of information through diverse media integration.
- **Example:** An educational website combining text, images, animations, and audio clips to explain a complex concept.

3. Multimedia:

- **Year:** 1960s
- **Founder:** Multiple contributors

- **Function:** Combines different media formats (text, images, audio, video) to create richer content experiences.
- **Keypoint:** Focuses on presentation and integration of diverse media, not necessarily linking between them.
- **Example:** A movie combining spoken dialogue, music, sound effects, and visual elements.

Progression and Interplay:

While sometimes used interchangeably, these terms represent distinct approaches to information presentation and user interaction:

- Hypertext - Navigational structure based on text links.
- Hypermedia - Hypertext with added multimedia elements.
- Multimedia - Broader integration of various media formats, not necessarily focused on linking.

VIDEO CONFERENCING, WEB PAGE DESIGNING, BAR CODING, CLOUD COMPUTING

Video conferencing:

- **Function:** Enables real-time audio and video communication between two or more people over a network.
- **Benefits:**
  - Improves communication and collaboration, especially for geographically dispersed teams.
  - Reduces travel costs and time.
  - Offers flexibility and convenience for remote work.
- **Examples:** Zoom, Google Meet, Microsoft Teams, Cisco Webex Meetings.

Components of video conferencing systems

The components of a video conferencing system include the following:

- A network for data transfer, such as wired/wireless local area network, wide area network, cellular wireless and residential broadband.
- Two or more video cameras or webcams that provide video input.
- Two or more microphones -- either an external microphone or one built into the accessing device.
- A computer screen, monitor, TV or projector that can broadcast video output.
- Headphones, laptop speakers or external speakers that can be used for audio output.
- Codecs, which can be hardware- or software-based, to reduce bandwidth by compressing and decompressing AV data. They typically include acoustic echo cancellation capabilities, which reduce audio delays to support real-time communication. Codecs may also include features like noise cancellation and acoustic fencing to minimize background noise during conferences.

Web page designing:

- **Function:** Creates and maintains web pages that are visually appealing, informative, and user-friendly.
- **Skills required:** HTML, CSS, JavaScript, understanding of user experience (UX) principles.
- **Benefits:**
  - Creates a positive online presence for businesses and individuals.
  - Improves user engagement and conversion rates.
  - Ensures accessibility for all users.
- **Examples:** Wix, Squarespace, WordPress, Webflow.

Bar coding:

- **Function:** Stores information in a machine-readable format using lines and spaces.
- **Benefits:**
  - Improves efficiency and accuracy in data collection and tracking.
  - Reduces manual data entry errors.
  - Enables automation in various industries.
- **Examples:** UPC codes (products), QR codes (websites, marketing), ISBN codes (books).

Cloud computing:

- **Function:** Delivers on-demand access to computing resources (servers, storage, databases, software) over the internet.
- **Benefits:**
  - Scalability and flexibility: Pay for what you use and easily scale up or down resources.
  - Cost-effectiveness: No upfront investment in hardware infrastructure.
  - Accessibility: Access data and applications from anywhere with an internet connection.
- **Examples:** Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP).

Virtual Reality, Augmented Technologies

Virtual Reality (VR):

- **Function:** Creates immersive, simulated environments accessed through VR headsets, allowing users to explore virtual worlds.
- **Library Applications:**
  - **3D historical recreations:** Experience historical events and environments firsthand.
  - **Virtual tours of libraries and archives:** Explore collections and exhibitions remotely.
  - **Interactive learning experiences:** Participate in gamified learning modules on specific topics.
  - **Accessibility tools:** Provide immersive experiences for users with disabilities.

Challenges:

- Cost of VR equipment and development.
- Potential for user disorientation and nausea.
- Limited accessibility for individuals with certain physical limitations.

Augmented Technologies (AR):

- **Function:** Superimposes digital information onto the real world through smartphones or tablets, enhancing user experience.
- **Library Applications:**
  - **Interactive information displays:** Access information about library resources and exhibits through AR overlays.
  - **Treasure hunts and scavenger hunts:** Engage users in playful learning activities within the library.
  - **Augmented reality books:** Bring printed materials to life with interactive elements and multimedia content.
  - **Visualization tools:** Explore complex data sets and historical objects through AR visualizations.

Challenges:

- Reliability and accuracy of AR tracking technology.
- Potential for distraction and information overload.
- Limited accessibility for users with certain visual impairments.

Standards for Library Automation

Standards for Library Automation: Ensuring Interoperability and Efficiency

Library automation plays a vital role in organizing, managing, and delivering information in today's digital age. However, for libraries to function efficiently and collaborate effectively, they need to follow established standards. These standards ensure interoperability, allowing different library systems to communicate and exchange data seamlessly.

Key Standards in Library Automation:

- **Bibliographic Data Standards:**
  - **MARC 21:** The most widely used standard for representing bibliographic information, including books, articles, and other resources.
  - **Dublin Core:** A simpler standard for sharing basic metadata about resources, often used for online resources and digital libraries.
  - **Unicode:** A character encoding standard that ensures consistent representation of text in various languages.

- **Interoperability Standards:**
  - **Z39.50:** A protocol that allows libraries to search each other's catalogs and retrieve bibliographic records.
  - **SRU/SRW:** Search and Retrieve Web Service protocols that enable searching and retrieving bibliographic data over the internet.
  - **Open Archives Initiative (OAI-PMH):** A protocol for harvesting metadata about scholarly publications from repositories.
- **Data Communication Standards:**
  - **TCP/IP:** The suite of protocols that forms the foundation of internet communication.
  - **HTTP/HTTPS:** Protocols for transferring data over the internet, with HTTPS providing secure transmission.
  - **XML:** A markup language used for structuring and transmitting data in a machine-readable format.

Benefits of Following Standards:

- **Improved interoperability:** Libraries can easily share resources and collaborate with each other.
- **Reduced costs:** Libraries can avoid developing and maintaining their own unique systems.
- **Increased efficiency:** Standardized data formats enable faster and more accurate data processing.
- **Enhanced user experience:** Users can access information from multiple libraries through a single interface.

Challenges and Considerations:

- Keeping up with evolving standards requires ongoing training and investment.
- Some standards may not be suitable for all library types or needs.
- Balancing standardization with customization can be challenging.

Conclusion:

Standards play a crucial role in ensuring the smooth operation of library automation systems. By following these standards, libraries can promote resource sharing, collaboration, and efficiency, ultimately benefiting their users and communities.

Additional Resources:

- Network Development and Information Technology Standards Committee (NDITRSC) of the American Library Association: [[[invalid URL removed]]([invalid URL removed])]
- Digital Library Federation (DLF): [https://www.diglib.org]
- International Organization for Standardization (ISO): [https://www.iso.org]

BARCODE, RFID, NFC

Scanning Technologies in Libraries: Barcodes, RFID, and NFC

Libraries rely on various scanning technologies to track and manage their collections, streamline processes, and enhance user experience. Here's a breakdown of three common options:

1. Barcode:

- **Function:** Stores information (e.g., ISBN, call number) in a linear pattern of black and white bars, readable by scanners.
- **Pros:**
  - Simple and affordable technology.
  - Widely used and supported by most library systems.
  - Requires minimal maintenance.
- **Cons:**
  - Limited data storage capacity.
  - Requires line-of-sight scanning.
  - Susceptible to damage and wear.

2. RFID (Radio Frequency Identification):

- **Function:** Uses radio waves to transmit data from embedded tags attached to items.
-

- **Pros:**
  - Faster and more accurate scanning than barcodes.
  - Can read multiple tags simultaneously.
  - Works without line-of-sight.
  - Can store more data than barcodes.
- **Cons:**
  - More expensive than barcodes, both in tags and readers.
  - Requires specialized equipment and infrastructure.
  - Potential privacy concerns due to tag tracking capabilities.

3. NFC (Near Field Communication):

- **Function:** Uses short-range radio waves to transmit data between devices, typically smartphones and tags embedded in items.
- **Pros:**
  - Highly interactive technology, enabling users to access information directly through their phones.
  - Can trigger actions like self-checkout or mobile payments.
  - Compact and integrable into various library materials.
- **Cons:**
  - Limited data storage capacity compared to RFID.
  - Requires users to have NFC-enabled devices.
  - Not as widely adopted as barcodes or RFID in libraries yet.

Choosing the Right Technology:

The best scanning technology for a library depends on various factors, including:

- **Budget:** Barcodes are the most cost-effective, while RFID and NFC require higher initial investments.
- **Collection size and usage:** RFID and NFC can be more efficient for large collections with high circulation.
- **Desired functionalities:** RFID and NFC offer advanced features like self-checkout and mobile interactions.
- **Privacy concerns:** Libraries need to consider data privacy implications, especially with RFID.

Conclusion:

Barcodes, RFID, and NFC each offer unique advantages and disadvantages for library applications. By understanding their strengths and limitations, libraries can choose the technology that best suits their needs and budget, ultimately enhancing efficiency and user experience.

QR Code, Biometric

1. QR Code (Quick Response Code): Year - 1994, Founder - Denso Wave

- **Function:** Stores information in a two-dimensional barcode readable by smartphone cameras.
  - **Pros:**High data capacity compared to barcodes.
  - Easy to create and share freely.
  - Works at various angles and distances.
  - **Cons:**Requires users to have smartphones with QR scanning apps.
  - Larger than barcodes, potentially impacting aesthetics.
  - Limited interoperability with library systems compared to other technologies.
  - **Library Applications:**Accessing additional information about books, exhibits, or historical artifacts.
  - Downloading library apps or digital resources.
  - Participating in interactive scavenger hunts or learning activities.
  - Triggering self-service options like checkouts or returns.

2. Biometric Scanners: Year - Varies depending on the biometric type

- **Function:** Authenticates users based on unique physical characteristics like fingerprints, facial features, or iris scans.
  - **Pros:**Enhanced security and access control.
  - Potentially eliminates the need for physical library cards.
  - Faster and more convenient self-service options.
  - **Cons:**Costly infrastructure and ongoing maintenance.
  - Privacy concerns and ethical considerations regarding data collection and storage.
  - Potential for discrimination or bias depending on the chosen biometric.
  - **Library Applications:**Secure access to restricted areas or digital resources.
  - Self-checkout and contactless borrowing.
  - Personalized recommendations based on past borrowing patterns.
  - Accessing age-restricted materials with parental authorization.

SMARTCARD: FEATURES AND APPLICATIONS.

Smartcard: Features and Applications - A Secure and Versatile Tool

Smartcards, also known as chip cards or integrated circuit cards (ICCs), are tiny cards embedded with a microchip that offers far greater capabilities than traditional magnetic stripe cards. Here's a breakdown of their key features and applications:

Features:

- **Security:** Smartcards offer multiple layers of security compared to magnetic stripes. They can store data securely using encryption, PIN protection, and tamper-proof mechanisms.
- **Data Storage:** While memory capacity varies, smartcards can hold significantly more information than magnetic stripes, allowing for complex applications.
- **Processing Power:** Some smartcards have built-in microprocessors that can perform calculations and store programs on-card, enabling advanced functionalities.
- **Contact vs. Contactless:** Smartcards can be contact-based, requiring physical insertion into a reader, or contactless, utilizing radio frequency identification (RFID) for proximity reading.
- **Multifunctionality:** Many smartcards can handle various applications on a single card, eliminating the need for multiple cards.

Applications:

- **Financial Transactions:** Debit cards, credit cards, and prepaid cards often use smartcard technology for secure payments and transactions.
- **Identification:** National ID cards, employee badges, and travel documents can incorporate smartcards for secure identification and access control.
- **Transportation:** Public transit systems use smartcards for fare payment and access to transportation networks.
- **Healthcare:** Patient ID cards can store medical records securely and facilitate healthcare transactions.
- **Mobile Network Access:** SIM cards in mobile phones are essentially smartcards that store subscriber information and enable network connectivity.
- **Logical Access Control:** Smartcards can grant access to buildings, computer systems, and restricted areas.
- **Loyalty Programs:** Loyalty cards with embedded chips offer secure and convenient reward points accumulation.

Benefits:

- Enhanced security compared to traditional cards.
- Increased functionality and versatility for various applications.
- Improved convenience and efficiency for users.
- Potential for offline functionality with on-card processing power.

Challenges:

- Initial cost of implementation and infrastructure setup.
- Potential compatibility issues with different reader systems.
- Security concerns related to data breaches and unauthorized access.

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EPRINTS SHORT INFO TABLE

Attribute	Details
Developer(s)	University of Southampton
Stable release	3.4.5 / 2023-05-25
Repository	github.com/eprints/eprints3.4 (Edit this at Wikidata)
Written in	Perl
Operating system	Cross-platform
Type	Institutional repository software
License	GPL-3.0-or-later
Website	eprints.org

GREENSTONE SHORT INFO

Attribute	Details
Developer(s)	University of Waikato
Stable release(s)	Greenstone3 3.10 / February 28, 2021; 2 years ago
	Greenstone2 2.87 / October 1, 2017; 6 years ago
Repository	trac.greenstone.org/browser/main/trunk/greenstone3 (Edit this at Wikidata)
Operating system	Cross-platform
Type	Digital libraries
License	GPL
Website	www.greenstone.org

LIBRARY MANAGEMENT SOFTWARES -OPEN SOURCE

Five Generations of Library Automation Software: Short Notes

Key Points:

- **Evolution:** Library automation software has evolved through five generations, driven by technological advancements.
- **First Generation (Non-Integrated, Non-Portable):**
  - Piecemeal, module-based systems.
  - Limited integration between modules.
  - Focus on circulation and cataloging.

  - Hardware and platform specific.
- **Second Generation (Hardware & Platform Independence):**
  - Portable between various platforms (UNIX, DOS).
  - Links between systems for specific functions.
  - Command-driven or menu-driven interfaces.
- **Third Generation (GUI, Integration, Client-Server):**
  - Fully integrated systems with relational databases.
  - Client-server architecture.
  - Color GUI with windows, icons, menus, and direct manipulation.
  - Embodiment of open system interconnection standards.
- **Fourth Generation (Web Architecture, Unicode, Digital Media):**
  - Web-centric architecture for access over the internet.
  - Unicode compliance for multilingual support.
  - Multimedia graphical user interfaces.
  - Access to multiple sources from single interface.
- **Fifth Generation (Cutting-Edge Technologies):**
  - Web-scale management, cloud computing, and web 2.0 features.
  - AJAX, API, and linked open data technologies.
  - Rise of open-source ILS and open standards implementation.

LIST OF LIBRARY MANAGEMENT SOFTWARES -OPEN SOURCE

Software	Developer	Year of release	Latest Release	Written in	Main purpose	License
Koha	Koha Community	2000	2021	Perl	ILS	GPL-3.0-or-later
PMB	PMB development team	2002	2022	PHP	ILS	CECILL-2.0
NewGenLib	Verus Solutions	2005	2015	Java	ILS	GPL
Evergreen	Georgia Public Library Service	2006	2021	Perl, C, XUL	ILS	GPL-2.0-or-later
OpenBiblio	OpenBiblio development team	2002	2018	PHP	ILS	GPL-2.0-or-later

CATEGORISATION OF ILSS BY DISTRIBUTION POLICY

Types of Library	Distribution policy	Systems
Large Library	Close source (Commercial)	VIRTUA ILS, SLIM 21, AUTOLIB
Medium Range	Close source (Commercial)	LibSys, SOUL, NIRMALS
Small Library	Close source (Freeware)	ABCD, e-Granthalaya, LAMP, WEBLIS, Librarian
	Open source (Freely available)	Evergreen ILS, Koha (version 2.x), Emilda, Koha (version 3.x), NewGenLib, PHPMyLibrar

RDBMS AND DBMS

What they are:

- **DBMS:** Database Management System - generic term for software managing databases.
- **RDBMS:** Relational Database Management System - specific type of DBMS based on tables and relationships.

Relational Database: A Short History
Founded: 1970 by E.F. Codd at IBM Concept: Data stored in tables (relations) with specific rules and operators for manipulation.
Early Implementations:

- University of Michigan (1969)
- Massachusetts Institute of Technology (1971)
- IBM UK Scientific Centre (1970s)

Commercialization:

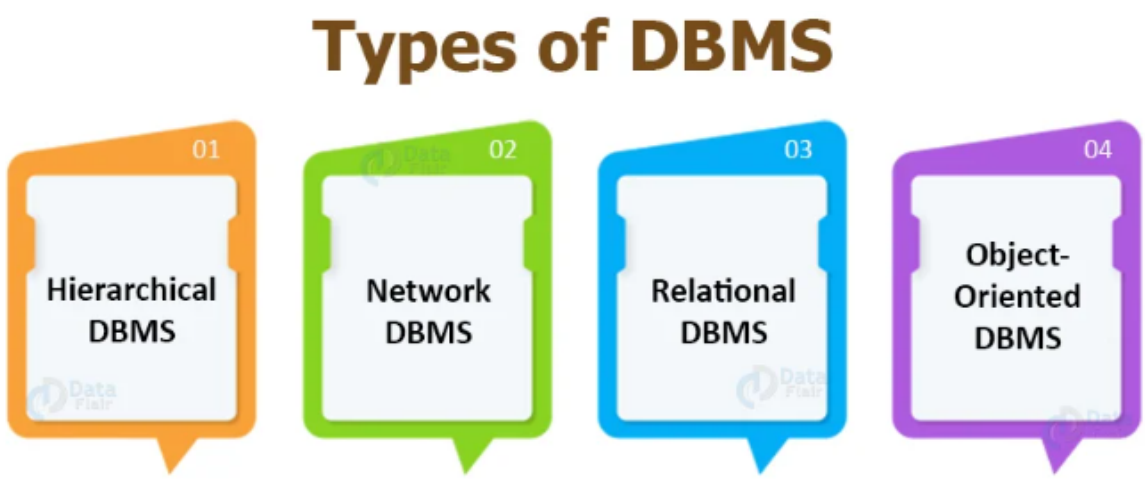
- First RDBMS sold: Multics Relational Data Store (1976)
- Followed by Oracle (1979), Ingres, IBM DB2, etc.
- 4D (1987) for Macintosh

Debates:

- Strict definition based on Codd's 12 rules vs. practical implementations (most RDBMS don't conform to all rules)
- "Truly-relational" vs. "pseudo-relational" systems

COMAPARISION -RDBMS AND DBMS

Feature	DBMS	RDBMS
Data structure	Hierarchical	Tables with rows and columns
User access	Single user	Multiple users
Hardware/software requirements	Lower	Higher
Data size	Smaller volumes	Any size
ACID compliance	No	Yes
Distributed databases	No support	Full support
Data relationships	No focus	Manage relationships within tables
Normalization	Not supported	Supported



1. Hierarchical Database

These DBMS employ parent and child relationships to store the data. Hierarchical DBMS is wide.

They store data in a tree-like structure so that it is easy to find and use. Similarly, the configuration of the DBMS is present in the nodes of the tree.

2. Network DBMS

Network DBMS supports many-to-many relations which results in complex database structures.

RDM Server is a major example of the network DBMS.

3. Relational DBMS

Relational DBMS stores data using the database relationships in the form of tables, also known as relations or tuples.

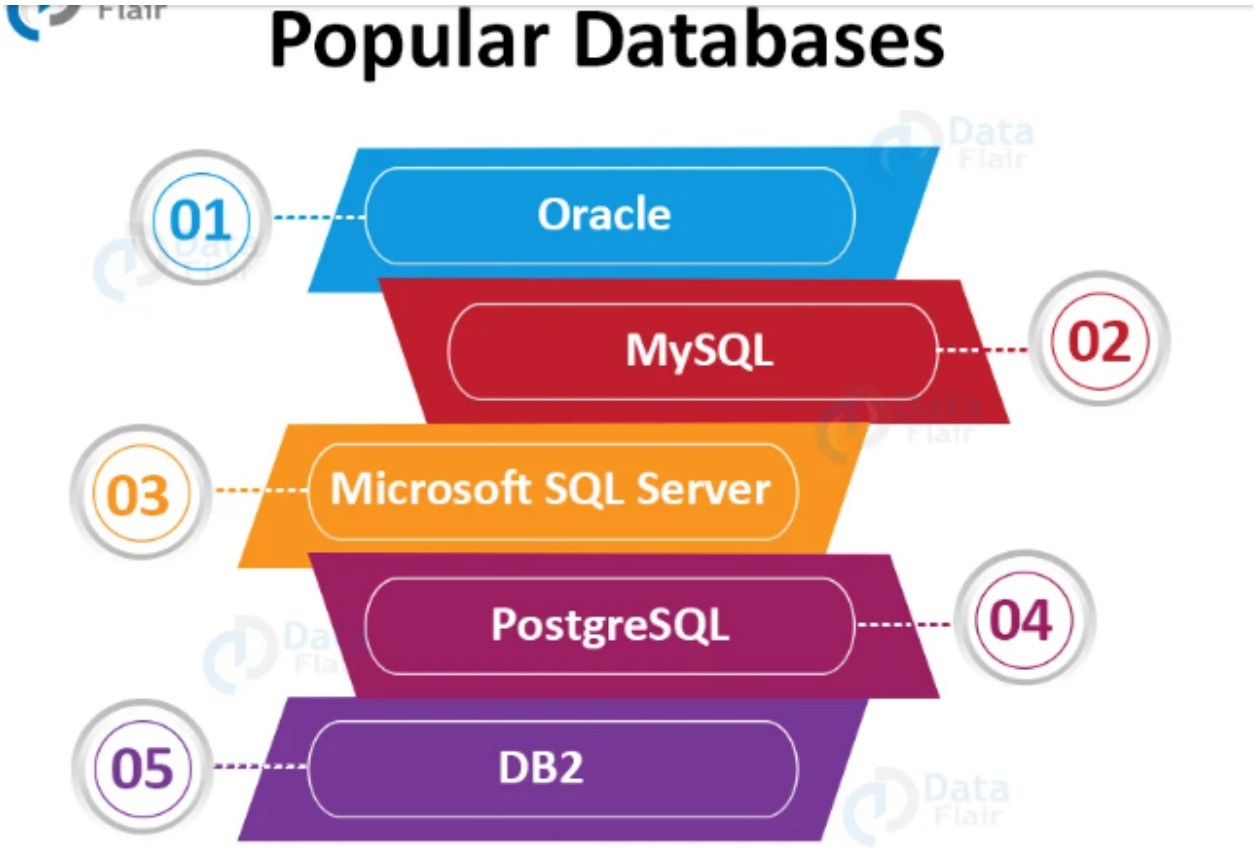
They do not support many to many relationships and have pre-defined data types that they can support. They are the most popular DBMS type in the industry.

Example: Oracle, MySQL, MS SQL, etc.

4. Object-Oriented Relational DBMS

This DBMS supports the storage of miscellaneous data types. They store data in the form of objects.

The object has attributes (i.e., name, id, gender, etc.) and the logic for what needs to be done with the data. Example: PostgreSQL.



XAMO(CORRECT IS XAMPP)

XAMPP is an acronym that stands for **X** (cross-platform), **A**pache (web server), **M**ySQL (database), **P**HP (programming language). It is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages.

APACHE, MYSQL, PHP

Software	Year of Creation	Founder(s)
Apache	1993	Apache Group (later Apache Software Foundation)
MySQL	1995	Michael Widenius (Monty), David Axmark, Allan Larsson
PHP	1993	Rasmus Lerdorf

DIGITAL PRESERVATION (DP)- INTRODUCTION, DILEMMAS AND CRITICAL CHALLENGES

In the library science world, digital preservation (DP) has become an essential yet complex endeavor. It's the process of ensuring long-term accessibility, authenticity, and usability of digital information. While crucial for safeguarding our digital heritage, DP presents unique challenges and dilemmas.

Introduction:

- Digital information permeates every aspect of our lives, from research publications and historical records to personal memories and cultural artifacts.
- Unlike physical objects, digital information is susceptible to degradation, obsolescence, and accidental deletion.
- DP ensures the continued accessibility and trustworthiness of this information for future generations.

Dilemmas:

1. Balancing Access vs. Privacy: Ensuring accessibility while protecting sensitive information.
2. Dark Archives vs. Active Curation: Deciding when to prioritize long-term storage vs. active management.
3. Born-Digital vs. Digitized Materials: Preserving different types of digital objects with varying complexities.
4. User Needs vs. Technical Feasibility: Catering to diverse user needs within technical limitations.
5. Community Participation vs. Centralized Control: Balancing democratic access with effective governance.
6. Cultural Diversity: Preserving culturally specific information formats and languages.
7. Personal vs. Institutional Responsibility: Defining individual and organizational roles in DP.
8. Open Access vs. Intellectual Property Rights: Balancing free access with fair compensation for creators.
9. Short-Term vs. Long-Term Planning: Addressing immediate needs while ensuring future accessibility.
10. Evolving Legal Frameworks: Keeping pace with changing legislation impacting digital information.

Critical Challenges:

1. Funding and Resource Allocation: Securing sustainable funding for long-term preservation efforts.
2. Scalability and Interoperability: Managing and accessing vast amounts of diverse digital data.
3. Technological Dependence: Mitigating risks associated with reliance on specific technologies.
4. Disaster Preparedness and Recovery: Implementing robust protection against accidental and intentional data loss.
5. Skill Development and Training: Educating and upskilling professionals in DP best practices.
6. Community Engagement and Partnerships: Building collaborative networks for knowledge sharing and resource pooling.
7. Metrics and Evaluation: Developing effective means to assess DP efforts and impact.
8. Awareness and Advocacy: Raising awareness of the importance of DP among stakeholders.
9. Evolving Technological Landscape: Adapting to ongoing advancements and their impact on preservation strategies.
10. Ethical Considerations: Addressing emerging ethical issues surrounding digital information and its preservation.

Concepts, Terminology, and Standards

Digital Preservation: Concepts, Terminology, and Standards

Concepts:

1. **Bitstream vs. Information Object:** Differentiating raw data from its intended meaning and structure.
2. **Authenticity and Integrity:** Ensuring information remains unchanged and verifiable over time.
3. **Ingest and Selection:** Bringing digital objects into the preservation system and choosing what to preserve.
4. **Emulation vs. Migration:** Reinterpreting older formats vs. converting them to current ones.
5. **Dark Archives vs. Active Curation:** Storing for long-term access vs. actively managing and using data.
6. **Metadata:** Descriptive information about the digital object itself.
7. **Provenance:** Tracking the origin and history of the digital object.
8. **Sustainability:** Long-term viability of preservation solutions.
9. **Access Control and Security:** Balancing accessibility with information protection.
10. **Obsolescence and Long-Term Accessibility:** Addressing risks of evolving formats and technologies.

Terminology:

1. **Digital Object Identifier (DOI):** Unique identifier for digital content.
2. **Preservation Metadata Format (PREMIS):** Standard for recording preservation actions.
3. **Open Archival Information System (OAIS):** Reference model for archival systems.
4. **Representation Information Format (RIF):** Standard for describing digital object versions.
5. **Emulation:** Software-based interpretation of older formats.
6. **Migration:** Conversion of digital objects to new formats.
7. **Fixity:** Ensuring no unauthorized changes occur to the digital object.
8. **Bit Preservation:** Keeping the raw data bits intact.
9. **Ingest:** Bringing digital objects into the preservation system.
10. **Curation:** Managing and maintaining digital objects over time.

Standards:

1. **MetaArchive Preservation Trust (MAPTRUST):** Non-profit providing preservation certification.
2. **Library of Congress Digital Preservation:** Resources and best practices.
3. **Digital Preservation Coalition (DPC):** International collaboration on DP issues.
4. **National Digital Stewardship Alliance (NDSA):** US-based alliance for digital stewardship.
5. **International Council on Archives (ICA):** Guidelines and recommendations for DP.
6. **OASIS Reference Model for an Open Archival Information System (OAIS):** Provides a framework for archival systems.
7. **PREMIS:** Standardized vocabulary for preservation metadata.
8. **METS (Metadata Encoding and Transmission Standard):** Standard for packaging digital objects and metadata.
9. **NARA Electronic Records Archive (NARA ERA):** US standard for managing electronic records.
10. **ISO 14523 and 16363:** Standards for managing electronic records and metadata.

Systems, Integrity, Stability, and Authenticity, Digital Preservation Frameworks,

Systems:

1. **Digital Repository:** Secure storage and management platform for digital objects.
2. **Emulation Software:** Interprets and runs older software and hardware environments.
3. **Migration Software:** Converts digital objects to new formats.
4. **Metadata Management Systems:** Store and manage information about digital objects.
5. **Authentication Systems:** Verify the identity and trustworthiness of digital objects.
6. **Distributed Storage Systems:** Provide geographically diverse storage for redundancy.
7. **Cloud Preservation Services:** Utilize cloud infrastructure for digital preservation.

- **Open-Source Preservation Tools:** Freely available software for DP tasks.
- **Community-Driven Platforms:** Collaborative platforms for shared preservation efforts.
- **Institutional Repositories:** Preserve research outputs and other institution-specific materials.

Integrity, Stability, and Authenticity:

- **Fixity Checks:** Regularly verifying that digital objects haven't changed unintentionally.
- **Checksums:** Unique identifiers used to detect changes in digital content.
- **Bitstream Preservation:** Guaranteeing the long-term preservation of the raw data bits.
- **Emulation and Migration:** Ensuring continued access and interpretation of digital objects over time.
- **Metadata Management:** Recording information about origin, modifications, and context to ensure authenticity.
- **Provenance Tracking:** Recording the history and chain of custody of digital objects.
- **Trusted Repositories:** Ensuring secure and reliable storage environments.
- **Redundancy and Disaster Recovery:** Protecting against data loss from equipment failures and natural disasters.
- **Standardized Practices:** Applying consistent procedures to minimize errors and ensure data integrity.
- **Regular Audits and Review:** Periodically assess the effectiveness of preservation measures.

Digital Preservation Frameworks:

- **Open Archival Information System (OAIS):** Reference model for archival systems.
- **Digital Curation Centre (DCC) Curation Lifecycle Model:** Framework for managing digital objects over time.
- **Library of Congress Digital Preservation Framework:** US-based framework for libraries and archives.
- **CLAIRMONT Model:** Focuses on long-term access and sustainability.
- **PREMIS Framework:** Standards for capturing and sharing preservation metadata.
- **META Schema Standard:** Standard for structured description of digital objects.
- **Trustworthy Repositories Audit Methodology (TRAM):** Evaluates trustworthiness of digital repositories.
- **NDSA Levels of Digital Preservation:** Defines different levels of preservation commitment.
- **NARA Electronic Records Archive (NARA ERA):** US standard for managing electronic records.
- **International Standards Organization (ISO) Standards:** Various standards related to digital preservation (e.g., ISO 16363, ISO 14523).

Understanding the digital object, Strategies for digital preservation, Preservation planning

Understanding the Digital Object:

- **Components:** Digital objects consist of data, metadata, and context.
  - **Data:** The raw bits of information making up the content.
  - **Metadata:** Descriptive information about the data (e.g., author, format, creation date).
  - **Context:** The environment and relationships surrounding the object (e.g., software used, hardware platform).
- **Complexity:** Unlike physical objects, digital objects are inherently complex and dynamic, requiring nuanced preservation approaches.
- **Challenges:** Understanding the digital object requires expertise in various fields, including technology, information science, and archival principles.

Strategies for Digital Preservation:

- **Selection:** Identifying and prioritizing objects for preservation based on their value and significance.
- **Ingest:** Bringing objects into the preservation system, including metadata capture and integrity checks.
- **Storage:** Securely storing objects in reliable and accessible locations, considering redundancy and disaster recovery.
- **Fixity:** Ensuring the data remains unchanged over time through checksums and other verification methods.
- **Representation:** Maintaining access by preserving the original format or migrating to new formats as needed.
- **Metadata Management:** Maintaining accurate and complete metadata throughout the preservation lifecycle.
- **Authentication:** Verifying the authenticity and integrity of the digital object.
- **Access:** Providing authorized users with access to the preserved object while respecting access restrictions.

Preservation Planning:

- **Assessment:** Identifying risks and challenges specific to the collection and resources available.
- **Policy Development:** Establishing policies and procedures for selection, ingest, storage, access, etc.
- **Resource Allocation:** Securing funding, personnel, and technology for long-term preservation efforts.
- **Collaboration:** Partnering with other institutions and stakeholders to share expertise and resources.
- **Metrics and Evaluation:** Regularly monitoring and evaluating the effectiveness of preservation efforts.

ADDITIONAL NOTES

PRESERVATION METADATA: IMPLEMENTATION STRATEGIES (PREMIS)

PREMIS: Preserving Your Digital Heritage

Origin and Purpose:

- The **PREMIS Working Group** was formed to advance digital object preservation through metadata frameworks.
- It built upon the earlier **Preservation Metadata Framework (PMF)** initiated by OCLC and RLG.
- Their goal was to create a **core data dictionary** and best practices for managing preservation metadata.

Key Milestones:

- **2001-2002:** PMF working group identified needed metadata elements.
- **2003:** PREMIS tasked with developing an implementable data dictionary.
- **2004:** Working group published a report on current preservation practices.
  - **May 2005:** Release of **Data Dictionary for Preservation Metadata 1.0**:Comprehensive resource for implementing preservation metadata.
  - Includes data model, glossary, usage examples, and XML schema.
- **June 2015:** Release of current **Version 3.0**.

Technical Foundation:

- PREMIS data dictionary builds upon the **Open Archival Information System (OAIS)** reference model.
- OAIS provides a conceptual structure for archived objects and their metadata.
- PREMIS translates this framework into practical, implementable units.

Benefits:

- **Standardized:** Enables consistent documentation and exchange of preservation information.
- **Interoperable:** Facilitates data sharing and collaboration across repositories.
- **Sustainable:** Ensures long-term access and understanding of digital objects.

The PREMIS data model consists of four interrelated entities:

1. Object (divided into three subtypes)
2. Event
3. Agent
4. Rights

With each semantic unit in the data dictionary categorized in one of these areas.

METADATA STANDARD LIST 1

Metadata Standard	Description
PREMIS	Preservation Metadata: Implementation Strategies, an international standard for metadata to support the preservation of digital objects.
Dublin Core	A simple yet powerful standard for cross-domain information resource description.
Encoded Archival Description (EAD)	A standard for encoding archival finding aids using XML.
Visual Resources Association (VRA) Core	A standard for the description of works of visual culture as well as the images that document them.
Categories for the Description of Works of Art (CDWA)	Describes the content of art databases by articulating a conceptual framework for describing and accessing information about works of art, architecture, other material culture, groups and collections of works, and related images.
Machine-Readable Cataloging (MARC)	A standard for encoding a description of an item wherein a computer can interpret and manipulate the data.
Metadata Object Description Schema (MODS)	A schema for a bibliographic element set that may be used for a variety of purposes, and particularly for library applications.

METADATA STANDARD LIST 2

Name	Focus	Description
FOAF	Friend of a Friend	The Friend of a Friend (FOAF) project aims to create a Web of machine-readable homepages describing people, their connections, and activities.
Dublin Core	Networked resources	Dublin Core is an interoperable online metadata standard focused on describing networked resources.
DOI	Networked resources	Digital Object Identifier provides a system for identifying and managing information on digital networks, ensuring persistence and interoperability.
RDF	Web resources	Resource Description Framework is a method for modeling information in web resources, enabling the semantic web.
DDI	Archiving and Social Science	The Data Documentation Initiative is an international effort to establish a standard for technical documentation describing social science data.
EAD	Archiving	Encoded Archival Description is a standard for encoding archival finding aids using XML, commonly used in archival and manuscript repositories.
MARC	Librarianship	MAchine Readable Cataloging is a standard for bibliographic and related information in machine-readable form, widely used in library cataloging systems.
METS	Librarianship	Metadata Encoding and Transmission Standard is an XML schema for encoding descriptive, administrative, and structural metadata regarding objects within a digital library.
MODS	Librarianship	Metadata Object Description Schema is a schema for bibliographic metadata, commonly used in library applications.
MADS	Librarianship	Metadata Authority Description Schema is a schema for authority control used in library applications to manage names and geographical areas.
XOBIS	Librarianship	XML Organic Bibliographic Information Schema is an XML schema for modeling bibliographic data, aiming to improve on MARC data representation.
RAD	Librarianship and archiving	The Rules for Archival Description is the Canadian archival descriptive standard for describing archival materials.

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PAPER 2 -UNIT 4

RPSC COLLEGE LIBRARIAN

Saket Sharma

Unit 4

Library Automation- Areas of automation, Planning, Hardware and Software Selection, OPAC. Networks-ERNET, NICNET, DELNET, JANET, BLAISE, OCLC, INFLIBNET, INTERNET- Components, Services, Browsing-Web Browsers, Netscape, Navigator and Internet Explorer, Search Engines, MetaData, Digital Object Identifier (DOI). National and International Information Systems-NISSAT, NASSDOC, NISCAIR, DESIDOC, INIS, AGRIS, MEDLARS, INSPEC. Institutional Repositories- Dspace, Eprints, Greenstone etc. Open-Source Library Management Softwares – KOHA and others and RDBMS and DBMS with XAMO (Apache, MySQL, PhP).

Digital Preservation (DP)- Introduction, Dilemmas and critical challenges. Fundamentals - Concepts, terminology, standards, systems, Integrity, stability, and authenticity, Digital preservation frameworks, Understanding the digital object, Strategies for digital preservation, Preservation planning.

Library Automation

The Oxford English Dictionary (Simpson & Weiner, 1989) defines automation as “application of automatic control to any branch of industry or science by extension, the use of electronic or mechanical devices to replace human labour”.

ALA Glossary of Library and Information Science defines automation as “the performance of an operation, a series of operation or a process by self activating, self controlling, or automatic means. Automation implies use of automatic data processing equipment such as a computer or other labour saving devices”. Although, the term automation was first introduced by D. S. Harder in 1936, the word library automation is being used in literature for the last five decades.

According to Encyclopedia of Library and Information Sciences (Kent, 1977) “Library Automation is the use of automatic and semiautomatic data processing machines to perform such traditional library activities as acquisitions, cataloguing and circulation. These activities are not necessarily performed in traditional ways, the activities themselves are those traditionally associated with libraries; library automation may thus be distinguished from related fields such as information retrieval, automatic indexing and abstracting and automatic textual analysis

Library Automation: A Short History

Early Steps (1930s-1940s):

- Punch card equipment introduced for circulation and acquisition.
- Progress slowed by Great Depression and World War II.

Landmark Developments:

- 1946-47: ENIAC and EDVAC computers built, paving the way for larger, faster systems.
- 1947: Invention of the transistor miniaturized computers and increased speed/capacity.
- 1951: UNIVAC I, the first commercial computer using transistors, launched.
- 1960s: Integrated circuit invented, further miniaturizing and enhancing computers.
- 1961: H.P. Luhn develops KWIC indexing, a new way to access information electronically.
- Mid-1960s: Library of Congress (LoC) starts creating machine-readable catalog records (MARC).

Standardization and Sharing (1960s-1970s):

- 1974: MARC II format becomes a national standard for library data exchange.
- 1960s-1970s: Development of integrated library systems (ILS) for managing all library operations.

The Rise of Networks and Digital Resources (1970s-1990s):

- 1969: ARPANET, a precursor to the internet, established, enabling email, telnet, and ftp.
- 1970s: Commercial reference databases like DIALOG become accessible, with BALLOTS being an early pioneer.
- 1970s: The Online Computer Library Center (OCLC) begins cooperative cataloging, facilitating resource sharing.
- 1980s: Microcomputers explode in popularity, bringing library automation to new levels.
- 1980s: UNESCO distributes Micro CDS/ISIS software, specifically designed for library applications in developing countries.
- 1980s: Integrated library packages like LibSys in India emerge.
- 1980s: Spreadsheets and databases improve library administration and information dissemination.
- Late 1980s: CD-ROMs revolutionize access to information, offering databases, software, and information previously only available in print.

- Early 1990s: Libraries gain flexibility with databases available on both online and CD-ROM formats.
- 1990s: The internet explodes, fostering communication, resource sharing, and new information delivery methods.
- 1993: The World Wide Web becomes the dominant force in information access and retrieval.
- 1990s: Expert systems and knowledge systems emerge, powered by advancements in hardware and software.

The Information Age and Beyond (1990s-Present):

- Continued development of web-based library services and resources.
- Rise of digital libraries and open access initiatives.
- Integration of social media and mobile technologies into library services.
- Focus on data analysis, user experience, and personalized services.
- Continued evolution of library automation to meet the ever-changing needs of users and the information landscape.

Need and Purpose of Library Automation: A Summary

The explosion of information:

- Manual systems struggle with the vast amount of data, making them outdated and inefficient.
- Computerized storage and retrieval offer a solution, providing:
  - Accuracy and speed
  - Timeliness and value-added information

Benefits of library automation:

- **Reduced manual work:**
  - Repetitive, tedious tasks are automated, freeing up staff for more valuable activities.
  - Single bibliographic record used across multiple operations, eliminating duplication.
- **Improved accessibility:**
  - Decentralized access allows staff and users to check information readily.
  - Real-time availability and status updates for resources.
- **Enhanced efficiency:**
  - Streamlined operations save time and resources.
  - Increased accuracy and economy in labor.
- **Staff motivation and engagement:**
  - Technology can be appealing and motivating, especially for younger staff.
- **Increased productivity:**
  - Automates clerical tasks, freeing professionals for user-oriented services.
  - Improved staff output and efficiency.
- **Quality service improvement:**
  - Faster, more accurate information access for users.
  - Enhanced user experience and satisfaction.

Overall, library automation is essential for managing the information deluge and providing efficient, user-friendly services in the digital age.

Planning for Library Automation(Selection of Hardware and Software)

Library automation is a complex but rewarding undertaking. Careful planning is crucial for a successful implementation.
Here's a summary of key aspects to consider, along with some additional data points for your reference:

I. Needs Assessment and Goals:

- **Identify needs:** Analyze current library operations, challenges, and user requirements. Consider data like collection size, staff workload, user traffic, and budget constraints.
- **Define goals:** Clearly articulate what you want to achieve with automation. Aim for measurable objectives like improved efficiency, increased accessibility, and enhanced user experience.

II. Technology Selection:

  - **Software:** Research and evaluate Integrated Library Systems (ILS) based on functionality, compatibility, budget, and vendor support. Look for features like:Cataloging and metadata management
  - Circulation and patron management

- Search and discovery tools
- Reporting and analytics
- Mobile access compatibility
- Consider open-source ILS options for budget-conscious libraries.
- **Hardware:** Determine server and client computer needs based on software requirements, user volume, and budget. Consider:Server capacity for data storage and processing
- Reliable workstations for staff and public access
- Accessibility features for users with disabilities
- Data security and backup solutions

III. Data Preparation and Migration:

- **Database building:** Plan for efficient data entry and migration of existing catalogs, patron records, and other information.Standardize data formats for consistency and compatibility.
- Consider data cleansing and deduplication to ensure accuracy.
- **Network infrastructure:** Establish a reliable and secure network to connect staff and public access points to the library system. Consider:Wired and wireless network options
- Bandwidth requirements for smooth data flow
- Cybersecurity measures to protect sensitive information

IV. Manpower and Training:

- **Staff training:** Plan comprehensive training for library staff on using the new system effectively.Cover basic operations, advanced functionalities, and troubleshooting.
- Consider e-learning modules, hands-on workshops, and individual support.
- **Manpower assessment:** Evaluate staffing needs and potential adjustments with automation.Redistribute tasks to leverage staff expertise in new areas.
- Consider hiring qualified personnel for system administration and support.

V. Budget and Timeline:

- **Develop a realistic budget:** Account for software licenses, hardware costs, network infrastructure, data migration, staff training, and ongoing maintenance.
- **Create a detailed timeline:** Set milestones for each stage of the implementation process, including vendor selection, data preparation, system installation, testing, and user training.

Remember, planning for library automation is an ongoing process. Regularly assess your needs, evaluate system performance, and adapt to new technologies and user demands.

Integrated Library Software:

Integrated Library Software (ILS) or integrated online library systems are utilized to computerize in-house library activities. These systems employ a single bibliographic database and a suite of interconnected application programs to facilitate various library operations.

ILS typically include modules for Acquisition, Cataloging, Circulation Control, Serials Control, and Public Access Catalogue (PAC). These modules are designed to streamline library processes and improve efficiency.

Online Public Access Catalogue (OPAC) often serves as a primary driver for implementing ILS, enabling users to search and access library resources remotely.

Various off-the-shelf ILS packages are available in the market, offering options for both single-user workstation mode (compatible with Windows and its different versions) and simultaneous multi-user environments on Windows/Linux Operating Systems.

Criteria for Selection of Software:

1. **Functionality:** Evaluate whether the software offers all necessary modules such as Acquisition, Cataloging, Circulation Control, Serials Control, and OPAC.
2. **Scalability:** Consider the ability of the software to accommodate the library's current needs as well as potential future growth.
3. **Compatibility:** Ensure compatibility with existing hardware and software infrastructure, including operating systems.
4. **User Interface:** Assess the usability and intuitiveness of the software interface for both library staff and patrons.

- **Support and Maintenance:** Consider the availability of technical support, updates, and maintenance services provided by the software vendor.
- **Cost:** Evaluate the total cost of ownership, including initial purchase price, licensing fees, implementation costs, and ongoing maintenance expenses.
- **Customization:** Determine the extent to which the software can be customized to meet specific library requirements and workflows.

Important library automation software packages

Sr. No.	Software Packages	Name of Developers
1	ABCD (Automation of Libraries and Centers of Documentation)	BIREME (WHO, Brazil)
2	E-Granthalaya	NIC
3	Evergreen	Georgia Public Library System
4	KOHA	Katipo Communications Ltd
5	Liberty 3	Softlink Asia
6	Libman	Master's Software, Nagpur
7	Librarian Suite	Soft-Aid Computers Ltd
8	Libsoft	LIBSOFT SOLUTIONS
9	Libsys	Libsys Corporation
10	Libtech	Libtech Software Developers
11	Nettlib	Kaptron Pvt Ltd
12	NewGenLib	Verus Solutions Pvt. Ltd.
13	OPALS	Media Flex Inc
14	SLIM ++ & SLIM 21	Algorhythms Consultants Pvt Ltd
15	SOUL	INFLIBNET Centre
16	Troodan	Comtek Computers
17	Virtua	Virginia Tech Library System (VTLS) Inc

ERNET(Education and Research Network)

Key Points:

- **Established:** 1986, initiated by Govt. of India & UNDP
- **Mission:** Provide internet & IT services to education & research institutions
- **Focus:**
  - Connectivity
  - Hosting & providing relevant information
  - Research & Development (R&D)
  - Training
  - Technology focus areas:
    - National Academic & Research Network
    - R&D in Data Communication & Applications
    - Human Resource Development in Networking
    - Educational Content
    - Campus-wide High Speed Local Area Networks

History of ERNET:

- **1986–87:** ERNET commenced with a Dial-up network.
- **Early Services:** Initially, ERNET provided UUCP mail service.
- **1991:** Installed the first leased line of 9.6 kbit/s between Delhi and Mumbai.

- **1990:** Allotted Class B IP address 144.16.0.0 by InterNIC; later, Class C addresses were allotted by APNIC.
- **1992:** Achieved connectivity among all IITs, IISc Bangalore, DOE Delhi, and NCST Mumbai via 9.6 kbit/s leased lines. Commissioned a 64 kbit/s Internet gateway link to UUNet in Virginia.
- **1998:** ERNET India registered as an Autonomous Society.
- **1999-2000:** Established a new terrestrial high-speed backbone.
- **2000:** Upgraded POP infrastructure.
- **1993:** Set up a Satellite WAN.
- **Present Day:** Serves 1100 institutes under various schemes.

ERNET International Gateway and PoP Sites:

ERNET operates through a network of backbone sites, facilitating access to services for organizations across various geographical locations.

- **ERNET Headquarters, New Delhi**
- **Centre for Development of Advanced Computing, Mumbai**
- **Indian Institute of Science, Bangalore**
- **Indian Institute of Technology, Madras**
- **Indian Institute of Technology, Kharagpur**
- **Inter-University Centre for Astronomy and Astrophysics, Pune**
- **Variable Energy Cyclotron Centre, Kolkata**
- **Indian Institute of Technology, Kanpur**
- **Indian Institute of Technology, Roorkee**
- **University of Hyderabad**
- **Center for Advanced Technology, Indore**
- **Odisha Computer Application Centre, Bhubaneswar**
- **Indian Institute of Information Technology and Management, Thiruvananthapuram**
- **National Institute of Electronics & Information Technology, Gorakhpur**
- **Indian Institute of Technology, Guwahati**
- **ERNET VSAT HUB, Bangalore**
- **Tezpur University, Tezpur**
- **APJ Abdul Kalam Technological University, Thiruvananthapuram**

ERNET OVERVIEW	
Formed	1986; 38 years ago
Jurisdiction	Government of India
Headquarters	5th Floor, Block-I, A Wing, Delhi IT Park, Shastri Park, Delhi - 110053, India
Ministers responsible	Ashwini Vaishnaw, Minister of Electronics and Information Technology, Rajeev Chandrasekhar, Minister of State
Government agency executives	S Krishnan, Chairman (Secretary MeitY) Neena Pahuja , Director General
Parent department	Ministry of Electronics and Information Technology
Website	ernet.in

NIC

National Informatics Centre (NIC) was established in 1976, and has since emerged as a "prime builder" of e-Government / e-Governance applications up to the grassroots level as well as a promoter of digital opportunities for sustainable development.

NIC, through its ICT Network, "NICNET" Which was launched 1977 in has institutional linkages with all the Ministries /Departments of the Central Government, 37 State Governments/ Union Territories, and about 736 District administrations of India. NIC has been instrumental in steering e-Government/e-Governance applications in government ministries/departments at the Centre, States, Districts and Blocks, facilitating improvement in government services, wider transparency, promoting decentralized planning and Centre, States, Districts and Blocks, facilitating improvement in government services, wider transparency, promoting decentralized planning and management, resulting in better efficiency and accountability to the people of India. "Informatics-led-development" programme of the government has been spearheaded by NIC to derive competitive advantage by implementing ICT applications in social & public administration.

Projects and Programs Under NICNET

- **Speedy Court Cases Trials**
- **Redressal of Public Grievances**
- **IT in Indian Courts**
- **AGMARKNET**
- **COIN – Cooperative Bank Management Software**
- **SMART Nagarpalika**
- **E-Panchayat**
- **IT Training**
- **IT in Environment**
- **Passport services**
- **SERMON**
- **IT & Road Transport**
- **Central Civil Pension**
- **Property Registration**
- **Land Records Computerization**
- **Utility Mapping of Delhi**
- **E-Granthalaya**
- **Treasury and Budget Computerization Programme**
- **Postal/Telecom Circle level Accounting Programme**
- **HOPTS**
- **ePOST**
- **Postal Life Insurance (PLI) Computerization projects**
- **Rural Bazaar**
- **Community Information Centre (CIC)**

NIC NATIONAL INFORMATICS CENTRE	
Abbreviation	**NIC**
Formation	**1976 (48 years ago)**
Type	**Digital Information**
Headquarters	**New Delhi**
Region served	**India**
Official language	**English and Hindi**
Director General	**Shri Amit Agrawal**
Parent organisation	**Ministry of Electronics and Information Technology**
Website	**nic.in**
ASN	**4758**
Traffic Levels	**70–80 Gbit/s**

DELNET

Key Points:

- **Established:** 1988 (registered 1992)
- **Headquarters:** New Delhi
- **Sponsors:**
  - National Information System for Science and Technology (NISSAT)
  - National Informatics Centre (NIC)
  - India International Centre
- **Mission:**
  - Promote resource sharing among libraries
  - Conduct research in library science and technology
  - Offer technical guidance to members
  - Coordinate collection development and reduce duplication
  - Facilitate document delivery and referral services
  - Develop specialized bibliographic databases
  - Collaborate with other networks and libraries

Key Services:

- **Online Databases:**Union catalogues (books, periodicals, serials, video/sound recordings, newspapers)
- Subject-specific databases (periodical articles, Indian specialists)
- Multilingual and special collection databases (Hindi books, Urdu manuscripts, theses/dissertations)
- **Interlibrary Loan & Document Delivery:**Online request system for document borrowing between member libraries
- **Bibliographic Services:**Retro-conversion of records between MARC standards
- Creation and maintenance of bibliographic databases for members
- **Reference Services:**Referral center providing assistance to members
- **Training Programs:**Monthly workshops on various library & information technology topics
- Courses on machine-readable cataloguing and bibliographic standards
- **Conferences & Events:**National Convention on Library and Information Networking (NACLIN)
- Regional workshops, lectures, and events
- **Publications:**"DELNET Newsletter" for updates and professional communication

JANET

JANET	
Predecessor	**SERCnet**
Formation	**1 April 1984**
Type	**National research and education network**
Purpose	**To manage the operation and development of the UK's national education and research network**
Headquarters	**Harwell, Oxfordshire, United Kingdom**
Region served	**UK**
Director (Jisc Technologies)	**Tim Kidd**
Website	**www.jisc.ac.uk/janet**
Formerly called	**Janet(UK); JANET**

Key Points:

- **What:** High-speed network for UK research & education communities
- **Provider:** Jisc (not-for-profit supporting education & computing)
- **Users:** 18 million, busiest NREN (National Research & Education Network) in Europe by data volume
- **Purpose:** Provides connectivity & collaborative services for research & education institutions
- **Coverage:**
  - All UK further & higher education institutions
  - Research Councils
  - Many schools (though some have separate internet connections)
- **Features:**
  - Metropolitan area networks across UK
  - Links to other European & worldwide NRENs
  - Extensive peering with other ISPs
  - Access to .ac.uk & .gov.uk domains
- **History:**
  - Established in 1984, predating NSFNET in the US
  - Initially used X.25 protocols, later transitioned to IP
  - SuperJanet series of upgrades increased network capacity and reach
  - SuperJanet5 introduced hybrid network offering (transit & dedicated bandwidth)
  - SuperJanet6 launched in 2013 with initial capacity of 2 Tbit/s
- **Current Status:** Operates under Jisc Services Limited with "Janet" brand name

BLAISE-British Library's Automated Information Service

- The British Library Automated Information Service (BLAISE) was launched in 1977.
- BLAISE is an online information retrieval service offering various library and information services.
- It is a fully integrated system allowing online information retrieval from MARC records and MEDLARS.
- BLAISE facilitates online cataloging and provides options for document delivery from the British Library Lending Division.

- The service collaborates with the U.S. Library of Congress in the Project for Machine-Readable Cataloging (MARC).
- BLAISE is accessible to libraries interested in participating in its cataloging facility.
- It is available for users in the United States and will soon be connected to EURONET for cheaper access by European users.
- BLAISE offers access through a graphical interface on the World Wide Web, making it one of the world's largest commercial services.

OCLC-Online Computer Library Center

Key Points:

- **Founded:** 1967, originally as Ohio College Library Center (OCLC)
- **Founders:** Presidents of Ohio colleges and universities
- **Mission:** Develop a shared library system for resource sharing and cost reduction
- **Current Name:** Online Computer Library Center (since 1981)
- **Headquarters:** Dublin, Ohio
  - **Key Figures:Founder:** Frederick Gridley Kilgour (1967-1980)
  - **Current President & CEO:** Skip Prichard
  - **Products & Services:WorldCat:** World's largest bibliographic database
  - **WorldShare:** Suite of library management tools and services
  - **Dewey Decimal Classification:** Library classification system
  - **EZproxy:** Authentication and access management tool
  - **OCLC Research:** Conducts research in library science and information technology
- **Magazine:** NextSpace

More Products name:WorldCat, Amlib, BIBLIOTHECAplus, Capira, CatExpress, CONTENTdm, Dewey Decimal Classification, EZproxy, FirstSearch, LBSOLIB, PiCarta, Relais ILL & D2D, ISIS-SunRise, Syndeo, Tipasa, TouchPoint, UnityUK, VDX, WebJunction, Wise, and WorldShare.

OCLC-Governing Board

Barbara Lison
Director
Bremen Public Library

Pilar Martinez
Chief Executive Officer
Edmonton Public Library

Skip Prichard
President and Chief Executive Officer
OCLC

INFLIBNET Centre (Information and Library Network Centre)

Key Points:

- **Founded:** March 1991 as a project under IUCAA, became independent in 1996
- **Mission:** Modernize university libraries and promote information access in India
- **Activities:**
  - High-speed data network for universities and information centers
  - Library automation support and resources
  - Development of library management software (SOUL)
  - Internet connectivity programs (UGC-Infonet)
  - Open access initiatives:
    - OJAS: Platform for hosting university journals
    - Shodhganga: Digital repository of theses and dissertations
    - Shodhgangotri: Repository of research topic synopses
    - IR@INFLBNET: Repository of research papers
  - Research & development in open source technologies
  - Database of scientists, researchers, and faculty
  - Bibliometric and scientometric studies
  - e-PG Pathshala: Gateway to postgraduate courses
  - Training programs in library management and ICT
- **Website:** https://www.inflibnet.ac.in/

Additional Notes:

- Major initiative by University Grants Commission (India)
- Plays a crucial role in library development and resource sharing in India
- Offers a wide range of services and resources for libraries and researchers

Director of INFLIBNET Centre (Information and Library Network Centre)

INTERNET- Components, Services

Key Points:

1. Introduction:

- Communication technology enables data and information transmission, unlocking computer storage and processing potential.
- Early computers operated standalone, but networking created information sharing and service opportunities.
- ARPANET (1970) pioneered packet switching for seamless communication across distances.
- Internet emerged in 1973 with IP protocol, later forming the foundation of TCP/IP suite.

2. Communication Networks:

Categories:

- **i. Public Switched Telephone Network (PSTN):**
  - Managed by common carriers (e.g., phone companies).
  - Offers dial-up connections and permanent leased lines for dedicated connections.
  - Leased lines offer better noise resistance than dial-up.
- **ii. Public Data Network (PDN):**
  - Analogous to PSTN, but for data communication.
  - Most Internet Service Providers (ISPs) use PDNs and PSTNs for connectivity.
- **iii. Integrated Services Digital Network (ISDN):**
  - End-to-end digital network supporting voice and non-voice services.

Internet: Components and Services

Components:

- **Network Infrastructure:** The physical and virtual network of interconnected computers, servers, routers, switches, and other devices forming the backbone of the internet.
- **Protocols:** Standardized rules and conventions governing data transmission and communication between devices on the internet, such as TCP/IP, HTTP, and FTP.
- **Domain Name System (DNS):** Hierarchical system translating domain names into IP addresses, facilitating user-friendly web browsing.
- **Internet Service Providers (ISPs):** Companies providing access to the internet through various means, including dial-up, broadband, and wireless connections.

Services:

- **World Wide Web (WWW):** A system of interlinked hypertext documents accessed via the internet, enabling users to navigate between web pages using hyperlinks.
- **Email:** Electronic mail service allowing users to send and receive messages over the internet.
- **File Transfer Protocol (FTP):** Protocol for transferring files between computers on the internet.
- **Streaming Services:** Platforms for streaming audio and video content over the internet, including video-on-demand services and live streaming platforms.
- **Social Media:** Online platforms enabling users to create, share, and interact with content and other users, fostering communication and networking.
- **Search Engines:** Tools for finding information on the internet by searching indexed web pages based on keywords or phrases.
- **Online Gaming:** Multiplayer gaming experiences hosted over the internet, allowing players to compete or cooperate in virtual environments.
- **Cloud Computing:** Delivery of computing services, including storage, processing power, and software applications, over the internet on a pay-per-use basis.
- **E-commerce:** Buying and selling of goods and services over the internet through online marketplaces, retail websites, and auction platforms.

- **Voice over Internet Protocol (VoIP):** Technology enabling voice communication and multimedia sessions over the internet, often used for voice and video calls.
- **Virtual Private Network (VPN):** Secure network connection allowing users to access the internet privately and securely by encrypting data transmitted over public networks.
- **Online Education:** Platforms offering educational courses, resources, and interactive learning experiences over the internet, enabling remote learning and skill development.

Classification: Based on geographic coverage of connected devices.

- **Categories:**

i. Local Area Network (LAN): Connects computers within a limited area (building, office).

- Offers high data transmission speeds over short distances.
- Common topologies: star, bus, ring.
- Uses cables (copper, fiber optic) for communication.

ii. Wide Area Network (WAN): Connects widely dispersed computers across cities or countries.

- Employs infrastructure provided by communication companies (telephone lines, cables, satellites).
- Examples: national networks, corporate networks spanning locations.

iii. Metropolitan Area Network (MAN): Covers a city or town, linking various organizations and institutions.

- Offers larger scale coverage than LANs but smaller than WANs.

iv. Gateways: Hardware and software connecting different networks.

- Translate communication protocols, address formats, and packet sizes.
- Allow smooth data exchange between networks of varying types (LANs, WANs).

Components

a. Network Hardware:

- **Computers:**
  - Servers: Powerful, central resources for clients.
  - Clients (Nodes): Access server resources.
  - Peer-to-peer networks: No dedicated servers.

b. Transmission Media:

- **Guided Media:**
  - Coaxial cables: Thick, shielded cables (old-school).
  - Twisted-pair cables: Standard phone cables (shielded or unshielded).
  - Fiber optic cables: Thin, glass cables with high bandwidth.
- **Unguided Media:**
  - Wireless transmission using radio waves or microwaves.

- **Network Card:**
  - Interface card connecting computer to network (NIC).
  - Handles communication protocols (often Ethernet).
- **Modem:**
  - Converts digital signals to analog for phone lines (less common now).
  - Types: External, USB, Internal, Built-in.
  - Modern speeds far exceed 56 kbps.
- **Switches:**
  - Connect network segments intelligently using MAC addresses.
  - More advanced than hubs.
- **Hubs:**
  - Simple devices connecting multiple devices with dedicated cables.
  - Easy setup, limited functionality.

- **Routers:**
  - Connect networks and determine optimal data paths (gateways).

C. Network Operating System (NOS): Software managing interconnected computers for resource sharing and efficient use.

- Controls user access, network resources, and security.
- Similar to individual operating systems, but functions across multiple machines.

- **Examples:** NetWare, LAN Manager, Solaris, Windows 2000 etc.
  i. **Categories:Peer-to-Peer:**No central server, all computers share resources directly.
  - Limited control and security
  - Examples: Windows 98 workgroups.

  ii. **Client-Server (Two-Tier):**Dedicated server provides resources and security.
  - Clients access server resources.
  - Enables efficient resource sharing and management.
  - Examples: Novell NetWare, Windows NT, UNIX, Windows 2000.

  iii. **Client-Server (Three-Tier):**Client software split into presentation (thin client) and logic layers.
  - Logic handled by separate server, offering improved performance and scalability.

Network Topology

1. Bus Topology:

- In a bus topology, all devices are connected to a central cable called the bus.
- **Advantages:**
  - Simple and inexpensive to implement.
  - Easy to add or remove devices without disrupting the network.
- **Disadvantages:**
  - Single point of failure: If the main cable fails, the entire network can go down.
  - Limited scalability: Adding too many devices can degrade performance.

2. Star Topology:

- In a star topology, all devices are connected to a central hub or switch.
- **Advantages:**
  - Centralized management: Easy to monitor and troubleshoot network connections.
  - Scalability: Additional devices can be added without affecting the rest of the network.
- **Disadvantages:**
  - Dependency on central device: If the central hub or switch fails, all connected devices lose connectivity.
  - Cost: Requires more cabling and equipment compared to bus topology.

3. Ring Topology:

- In a ring topology, each device is connected to two neighboring devices, forming a closed loop.
- **Advantages:**
  - Equal access to resources: Each device has the same access to the network.
  - Efficient data transmission: Data travels in one direction around the ring, reducing collisions.
- **Disadvantages:**
  - Single point of failure: If one device or connection fails, the entire network can be affected.
  - Limited scalability: Adding or removing devices can disrupt the entire network.

4. Mesh Topology:

- In a mesh topology, every device is connected to every other device in the network.
- **Advantages:**
  - Fault tolerance: Redundant connections ensure network reliability and resilience.
  - High performance: Multiple paths for data transmission can improve network efficiency.

- **Disadvantages:**
  - Complexity: Requires careful planning and management of connections.
  - Cost: High implementation and maintenance costs due to extensive cabling and equipment requirements.

5. Hybrid Topology:

A hybrid topology combines two or more different network topologies (e.g., star-bus, star-ring).

Advantages:

Offers flexibility to meet specific network requirements.

Provides redundancy and fault tolerance by leveraging multiple topology types.

Disadvantages:

Complexity: Requires careful planning and configuration to integrate different topologies.

Higher cost: Implementation and maintenance expenses may increase due to the combination of various topology types.

6. Tree Topology:

Also known as hierarchical topology, a tree topology combines characteristics of bus and star topologies.

Advantages:

Scalability: Suitable for large networks with multiple subnetworks.

Centralized management: Offers a hierarchical structure for efficient network management.

Disadvantages:

Dependency on root node: Failure of the root node can disrupt the entire network.

Limited flexibility: Adding or removing levels/subnetworks can be challenging.

7. Mesh Topology (Partial Mesh):

A partial mesh topology is a variation of the mesh topology where not all devices are directly connected to every other device.

Advantages:

Provides some degree of fault tolerance and redundancy.

Offers a balance between complexity and reliability compared to a full mesh topology.

Disadvantages:

Reduced fault tolerance: Failure of critical links can still impact network connectivity.

May not offer the same level of redundancy as a full mesh topology.

8. Point-to-Point Topology:

In a point-to-point topology, each device is directly connected to another single device.

Advantages:

Simplest topology: Easy to set up and maintain.

Efficient data transmission: Direct connections minimize latency and interference.

Disadvantages:

Limited scalability: Adding more devices requires additional point-to-point connections.

Lack of redundancy: Single points of failure can disrupt network connectivity

Browsing: Web Browsers, Netscape, Navigator, and Internet Explorer

Web Browsers:

- **Definition:** Software applications used to access and interact with websites on the internet.
- **Function:**
  - Fetch and display web pages.
  - Follow hyperlinks to navigate between pages.
  - Interact with web forms and applications.
  - Manage user preferences and settings.

Early Web Browsers:

- **Nexus (1989):** First graphical web browser, but not widely used.
- **Mosaic (1993):** Popularized the graphical web browser concept.

Netscape Navigator:

- Released in 1994.
- Dominated the browser market in the mid-1990s.
- Known for its speed, ease of use, and innovative features.
- Lost market share to Internet Explorer in the late 1990s.
- Discontinued in 2008.

Internet Explorer:

- Released in 1995 by Microsoft.
- Bundled with Windows operating systems, giving it a significant advantage.
- Became the dominant browser in the late 1990s and early 2000s.
- Criticized for its security vulnerabilities and lack of innovation.
- Lost market share to newer browsers like Firefox and Chrome in the late 2000s.
- Support for Internet Explorer ended in 2022.

Modern web browsers: Chrome, Firefox, Safari, Edge (successor to Internet Explorer)

Features of modern browsers: Tabbed browsing, bookmarks, extensions, security measures, accessibility options.

The evolution of web browsers reflects the changing landscape of the internet.

Search Engines, MetaData, Digital Object Identifier (DOI)

Search Engines:

- **Function:** Tools for finding information on the internet.
- **Work:** Crawl and index web pages, analyze content, and rank results based on relevance to user queries.
- **Popular examples:** Google, Bing, DuckDuckGo, Baidu.
- **Types:** General-purpose, specialized (e.g., academic, news).
- **Key considerations:** Search algorithms, query refinement, information literacy.

Metadata:

- **Definition:** Data about data, describing characteristics of information resources.
- **Examples:** Titles, authors, dates, keywords, subjects, file formats.
- **Importance:** Enhances discoverability, organization, and understanding of information.
- **Standards:** Dublin Core, MARC, PREMIS.
- **Applications:** Libraries, archives, digital repositories, scientific research.

Digital Object Identifier (DOI):

- **Function:** Persistent identifier for unique identification of digital objects.
- **Format:** Alphanumeric code (e.g., 10.1017/CBO9781107415324).
- **Benefits:** Ensures long-term access, citation tracking, and research reproducibility.
- **Registration:** Managed by International DOI Foundation.
- **Use cases:** Scholarly publications, datasets, multimedia resources.

For all topics please refer my Telegram Channel : Deep notes are available in Channel with posts: search with keywords
Telegram channel :https://t.me/UGCNETJRF2024JUNE

NISSAT-National Information System for Science and Technology

Key Points:

- **Initiated by:** Department of Scientific and Industrial Research (DSIR) in 1977.
- **Goal:** Facilitate information access and sharing through a network of centers and services.
  - **Key Achievements:Information Centers:** Established 13 national information and data centers.
  - **Value Added Patent Information Systems (VAPIS):** Created VAPIS in chemistry & chemical technology and engineering fields.
  - **National Access Centres to International Data Services (NACIDS):** Provided access to international databases.
  - **CD-ROM National Collection Centre:** Compiled a national collection of CD-ROM databases and products (defunct since 2003).
  - **Computers and Information Communication Technologies (ICTs) Based Activities:** Supported various national networks (DELNET, CALIBNET, etc.) and online resources.
  - **Promotion of Use of Standards:** Helped establish Common Communication Format (CCF) as a national standard.
  - **Information Technology Applications:** Provided software tools like CDS/ISIS and IDAMS to Indian institutions. Developed SANJAY for library automation.
  - **Dissemination:** Published newsletter "NISSAT Newsletter" (later "Information Today & Tomorrow", discontinued in 2002).

NISSAT-Centres

No.	Subject Area	Acronym	Host Institution
i)	Leather Technology	NICLAT	Central Leather Research Institute, Chennai
ii)	Food Technology	NICFOS	Central Food Technology Research Institute, Mysore
iii)	Machine Tools & Production	NICMAP	Central Manufacturing Engineering Institute, Bangalore
iv)	Drugs and Pharmaceuticals	NICDAP	Central Drug Research Institute, Lucknow
v)	Textiles & Allied Subjects	NICTAS	Ahmedabad Textile Industry's Research Association
vi)	Chemicals & Allied Industries	NICHEM	National Chemical Laboratory, Pune
vii)	Advanced Ceramics	NICAC	Central Glass and Ceramics Research Institute, Calcutta
viii)	Bibliometrics	NCB	Indian National Scientific Documentation Centre, New Delhi
ix)	Crystallography	NICRYS	University of Madras, Chennai
x)	CD-ROM	NICIDR	National Aerospace Laboratory, Bangalore
xi)	Management Science	NTCIAN	Indian Institute of Management Ahmedabad
xii)	Marine Science	NICMAS	National Institute of Oceanography, Goa

NASSDOC-National Social Science Documentation Centre

Key Points:

- **Established:** 1970 by Indian Council of Social Science Research (ICSSR)
- **Mission:** Provide information support for social science research in India
- **Resources:**
  - Library with social science periodicals, reference books, Indian periodicals, research dissertations, and microforms
  - Inter-Library Resource Centre for less-used collections
  - Union Catalogue of Social Science Periodicals and Serials (machine-readable)
- **Current Awareness Publications:**
  - Acquisition Update (monthly)
  - Conference Alert (quarterly)

- Indian Diary of Events (quarterly)
- Periodicals: Review of Contents (bimonthly)
- Social Science Research Index (irregular)
- Social Science News: Index to Select Newspapers in English (monthly)
- Samajik Vigyan Samachar (monthly, Hindi)

Additional Services:

- Document delivery (photocopies)
- Grants for documentation projects
- Consultancy and advisory services
- Training programs in social science documentation
- Participation in international information networks
- Computerization for information processing and services

NISCAIR-National Institute of Science Communication and Information Resources

Key Points:

- **Founded:** 2002 (Merged with National Institute of Science, Technology and Development Studies in 2021 to form NIScPR)
- **Location:** New Delhi, India
- **Parent organization:** Council of Scientific and Industrial Research (CSIR)
- **Mission:** Promote science communication and information dissemination
- **Activities:**
  - Published academic journals and magazines (available as open access)
  - Provided information services and resources
  - Offered Associateship in Information Science program (discontinued)
- **Publications:**
  - Academic journals (e.g., Annals of Library and Information Studies, Indian Journal of Chemistry)
  - Popular science magazines (Science Reporter, Vigyan Pragati, Science Ki Duniya)
  - Applied Innovative Research (AIR)
  - Bharatiya Vaigyanik evam Audyogik Anusandhan Patrika (BVAAP)
  - Indian Journal of Biochemistry and Biophysics (IJBB)
  - Indian Journal of Biotechnology (IJBT)
  - Indian Journal of Chemistry, Section A (IJCA)
  - Indian Journal of Chemistry, Section B (IJCB)
  - Indian Journal of Chemical Technology (IJCT)
  - Indian Journal of Experimental Biology (IJEB)
  - Indian Journal of Engineering and Materials Sciences (IJEMS)
  - Indian Journal of Fibre & Textile Research (IJFTR)
  - Indian Journal of Geo-Marine Sciences (IJMS)
  - Formerly Indian Journal of Marine Sciences
  - Indian Journal of Natural Products and Resources (IJNPR)
  - Formerly Natural Product Radiance (NPR)
  - Indian Journal of Pure & Applied Physics (IJPAP)
  - Indian Journal of Radio & Space Physics (IJRSP)
  - Indian Journal of Traditional Knowledge (IJTK)
  - Journal of Intellectual Property Rights (JIPR)

  - Journal of Scientific and Industrial Research (JSIR)
  - Journal of Scientific Temper (JST)
- **Open Access:** Provided open access to many publications through NISCAIR Online Periodicals Repository.

Magazines

- Science Reporter (SR)
- Vigyan Pragati (VP)
- Science Ki Duniya (SKD)

Repository

- Natural Products Repository (NPARR)
- **Additional Notes:**
  - Understand the history and mission of NISCAIR (now part of NIScPR).
  - Recognize the types of publications and information resources offered.
  - Be familiar with NISCAIR's contributions to open access in India.
  - Note the merger with NIScPR and discontinuation of the AIS program.

DESIDOC,-Defence Scientific Information and Documentation Centre

- **Function:** Collects, processes, and disseminates technical information for DRDO scientists.
- **Location:** Delhi, India
- **Director:** K Nageswara Rao
- **History:**
  - Founded in 1958 as Scientific Information Bureau (SIB).
  - Became a self-accounting unit and DRDO laboratory in 1970.
  - Moved to its own building in 1988.
- **Services:**
  - Provides S&T information to DRDO headquarters and laboratories.
  - Maintains a library of technical resources.

Library:

- Name: Defence Science Library (DSL)
- Head: Sh. Tapesh Sinha
- Collection: 262,000+ documents (physical and digital)
  - Services:Database access & reference materials
  - Digitization of research papers
  - Creation of presentation & promotional materials

Publications:

- **Role: Publication wing of DRDO**
  - Types:Specialized publications
  - Monographs
  - Technical bulletins
  - Online journals
  - Popular science publications
  - Availability:Unclassified & free online access for most publications
  - Monographs & others available for purchase
  - **Periodicals:Defence Science Journal (research)**
  - **Technology Focus (developed technologies)**
  - **DRDO Newsletter (internal activities)**
  - **DESIDOC Journal of Library & Information Technology (library & information technology developments)**

INIS,-International Nuclear Information System

Key Points:

- **Founded:** 1970, sponsored by the International Atomic Energy Agency (IAEA)
- **Mission:** Provide the world's leading information system on the peaceful uses of nuclear energy.
- **Members:** 99 countries and 17 international organizations.
  - **Function:**Collects and makes available scientific and technical information on nuclear science and technology, including economic and environmental aspects of non-nuclear energy (since 1992).
  - Avoids duplication by centralizing collection and processing, then decentralizing access and utilization.
- **Features:**International system
  - Cooperative network
  - Decentralized input, centralized processing
  - Standardized procedures and tools
  - Computer-based system
  - Document retrieval with subject indexing
  - High-quality indexing and abstracting
  - Dynamic and flexible
  - Machine-readable information
  - Mission-oriented
  - **Services:**National centers identify and process relevant documents, including abstracts and full copies.
  - IAEA collects, merges, and processes all input.
    - Outputs include:**INIS Atomindex:** Abstracting journal with indexes (bi-weekly)
    - **Magnetic tapes:** Database for current nuclear science literature
  - National centers utilize outputs for current awareness services, selective dissemination of information (SDI), etc.
  - INIS Clearinghouse provides microfiche copies of non-conventional literature.
  - Since 1997, non-conventional literature also available on CD-ROM.
- **Benefits for India:**Indian scientists have access to global nuclear science literature.
  - Bhabha Atomic Research Centre acts as the national center, contributing and utilizing INIS services.

AGRIS (International System for Agricultural Science and Technology)

Key Points:

- **What it is:** Global public domain database with over 12 million records on agricultural science and technology.
- **Founded:** 1975
- **Maintained by:** FAO (Food and Agriculture Organization)
- **Contributors:** Over 150 institutions from 65 countries
  - **Content:**Bibliographic records on various agricultural topics
  - Includes unique grey literature (unpublished reports, etc.)
  - 20% of records link to full-text documents online
  - **Features:AGRIS Search:** Allows keyword and other searches
  - **AGROVOC thesaurus:** Multilingual indexing system
  - **Mashup web application:** Links to related resources
  - **RDF conversion:** Enables data sharing and integration
  - **Supports OAI-PMH:** Interoperability with other systems
  - **Benefits:**Free access to global agricultural information
  - Supports developing countries
  - Promotes open access publishing
  - Promotes knowledge exchange and collaboration

Additional Notes:

- AGRIS 2.0 released in 2013 with new features and functionalities.
- AGRIS collaborates with CIARD (a joint initiative led by CGIAR, GFAR, and FAO) to further improve information sharing and management.
- CIARD RING project aims to map existing agricultural information services and promote interoperability.

MEDLARS (Medical Literature Analysis and Retrieval System)

What it is:

- A computerized bibliographic retrieval system for biomedical literature.
- Developed by the National Library of Medicine (NLM) in 1964.
- One of the first large-scale, computer-based search services available to the public.

Key points:

- **Predecessor:** "Index Medicus" (monthly guide to medical articles, manually compiled)
- **Developed:** 1957-1964, led by Frank Bradway Rogers
- **Initial features:**
  - Generated "Index Medicus" and other products.
  - Performed retrospective (historical) searches.
  - Not publicly accessible at first.
- **MEDLINE (MEDLARS Online):**
  - Launched in 1971, providing online access for medical libraries.
  - Limited to 25 simultaneous users.
  - Researchers submitted search requests to librarians.
- **PubMed:**
  - Free public version of MEDLINE, launched in 1997.
  - Accessible through the web with modern browsers.

Benefits:

- Improved efficiency and speed in searching medical literature.
- Increased accessibility of information for researchers and healthcare professionals.
- Promoted open access to scientific knowledge.

Additional Notes:

- MEDLARS was a pioneering system that paved the way for modern online databases like PubMed.
- Its development highlights the importance of using technology to manage information effectively.

Retrieval

- MEDLINE uses Medical Subject Headings (MeSH) for information retrieval. Engines designed to search MEDLINE (such as Entrez and PubMed) generally use a Boolean expression combining MeSH terms, words in the abstract and title of the article, author names, date of publication, etc. Entrez and PubMed can also find articles similar to a given one based on a mathematical scoring system that takes into account the similarity of word content of the abstracts and titles of two articles.
- MEDLINE added a "publication type" term for “randomized controlled trial” in 1991 and a MESH subset “systematic review” in 2001.

INSPEC

Category	Information
Producer	Institution of Engineering and Technology (United Kingdom)
History	1872–present
Access Providers	Inspec Direct, Datastar, Dialog, EBSCO Publishing, Elsevier, WTI-Frankfurt, Thomson Innovation, Web of Science, Ovid, Questel.Orbit, STN
Cost	Subscription
Coverage Disciplines	Physics, Computer science, Mechanical engineering, Electrical engineering, Electronic engineering, Communications, Control engineering, Information technology, Manufacturing, Mechanical engineering
Record Depth	Index & abstract
Format coverage	Journal articles, Standards, Patents, Thesis and Conference proceedings
Temporal coverage	1969–present
Geospatial coverage	Global
No. of records	Over 17,000,000 and growing
Update frequency	Weekly

Key Points:

- **Producer:** Institution of Engineering and Technology (IET), United Kingdom
- **Founded:** 1872
- **Access Providers:** Various commercial platforms like Inspec Direct, Datastar, EBSCO, etc.
- **Cost:** Subscription-based
- **Coverage:**
  - Disciplines: Physics, computer science, mechanical engineering, electrical engineering, etc.
  - Formats: Journal articles, standards, patents, theses, conference proceedings
  - Temporal coverage: 1969-present
  - Geospatial coverage: Global
  - Number of records: Over 17 million and growing
  - Update frequency: Weekly
- **Features:**
  - Index and abstract for scientific and technical literature
  - Emphasis on engineering, physics, and computer science
  - Trusted source for research and development
  - Available through various library subscriptions
  - Computer and Control Abstracts (ISSN 0036-8113)
  - Electrical and Electronics Abstracts (ISSN 0036-8105)
  - Physics Abstracts (ISSN 0036-8091)
  - Science Abstracts
  - Electrical engineering Abstracts* Electronics Abstracts
  - Control theory Abstracts
  - Information technology Abstracts

- Physics Indexes
- Electrical engineering Indexes
- Electronics Indexes
- Control theory Indexes
- Information technology Indexes
- Business automation Abstracts

Institutional Repositories (IRs)

Institutional Repositories (IRs)

- An IR is an open-access digital archive that collects, preserves, and disseminates the intellectual output of an institution, such as research articles, conference papers, theses, dissertations, and other scholarly works.
- IRs provide a central platform for researchers to share their work with a wider audience, increasing visibility, impact, and discoverability.
- They also help to preserve the institution's intellectual heritage and ensure long-term access to its scholarly output.

Benefits of using IRs:

- Increased visibility and impact of research
- Improved access to scholarly output
- Preservation of intellectual heritage
- Enhanced institutional reputation
- Support for open access initiatives

DSpace

Key Points:

- **What it is:** Open-source software for creating digital repositories, primarily for scholarly content.
- **Developer:** DuraSpace (Lyrasis)
- **Initial release:** November 2002
- Stable release 7.6.1 (15 November 2023)
- **Key features:**
  - Open access focus
  - Digital archiving capabilities
  - Long-term storage and preservation
  - Customizable to specific needs
  - Supports various digital formats (PDF, Word, etc.)
  - Advanced search functionalities with Apache Solr
  - Multilingual interface (22 languages)
  - Granular access control
  - Optimized for search engine indexing
  - Integration with other scholarly platforms
- **History:**
  - Joint development by MIT and HP Labs in 2002.
  - Transitioned to community-driven development with DSpace Federation and DSpace Foundation.
  - Currently under the leadership of DuraSpace (Lyrasis).
- **Impact:**
  - Supports thousands of repositories worldwide.
  - Enables open access to scholarly content.
  - Facilitates digital preservation and long-term accessibility.
  - Notable DSpace repositories
  - The World Bank - Open Knowledge Repository

- Apollo - University of Cambridge Repository
- Digital Access to Scholarship at Harvard
- DSpace@MIT
- Spiral - Imperial College London Repository
- WHO Institutional Repository for Information Sharing
- A full list of institutional repositories using DSpace software as well as others is available via the Registry of Open Access Repositories (ROAR) and at the DuraSpace Registry.

EPRINTS

Year Founded: 2000
Founder: University of Southampton School of Electronics and Computer Science
What it is:

- Free and open-source software for building open access repositories.
- Primarily used for institutional repositories and scientific journals.
- Complies with Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH).

Key Features:

- Open access focus
- Institutional repository capabilities
- Scientific journal management
- OAI-PMH compliance
- Customizable interface
- Multilingual support (English, Bulgarian, French, German, etc.)

Technology:

- Web and command-line application (Perl-based)
- Runs on Linux, Solaris, Mac OS X, and Windows
- Plugin architecture for data import/export, object conversion, and UI widgets
- Configurable with Perl and XML files
- HTML templates and CSS for customization

History:

- Created as a result of the 1999 Santa Fe meeting on OAI-PMH.
- Became one of the first and most widely used open access repository software.
- Inspired development of other similar software (e.g., DSpace).
- Version 3 released in 2007 with significant enhancements.

Impact:

- Supports numerous open access repositories worldwide.
- Promotes open access to scholarly and scientific information.
- Facilitates institutional knowledge management and dissemination.

Additional Notes:

- Differentiate between EPrints software and "eprints" (research articles).
- Understand the historical context and contributions of EPrints.
- Be familiar with its key features, technology, and customization options.
- Recognize its impact on open access and institutional repository development.

EPRINTS SHORT INFO TABLE

Attribute	Details
Developer(s)	University of Southampton
Stable release	3.4.5 / 2023-05-25
Repository	github.com/eprints/eprints3.4 (Edit this at Wikidata)
Written in	Perl
Operating system	Cross-platform
Type	Institutional repository software
License	GPL-3.0-or-later
Website	eprints.org

GREENSTONE SHORT INFO

Attribute	Details
Developer(s)	University of Waikato
Stable release(s)	Greenstone3 3.10 / February 28, 2021; 2 years ago
	Greenstone2 2.87 / October 1, 2017; 6 years ago
Repository	trac.greenstone.org/browser/main/trunk/greenstone3 (Edit this at Wikidata)
Operating system	Cross-platform
Type	Digital libraries
License	GPL
Website	www.greenstone.org

LIBRARY MANAGEMENT SOFTWARES -OPEN SOURCE

Five Generations of Library Automation Software: Short Notes

Key Points:

- **Evolution:** Library automation software has evolved through five generations, driven by technological advancements.
- **First Generation (Non-Integrated, Non-Portable):**
  - Piecemeal, module-based systems.
  - Limited integration between modules.
  - Focus on circulation and cataloging.

  - Hardware and platform specific.
- **Second Generation (Hardware & Platform Independence):**
  - Portable between various platforms (UNIX, DOS).
  - Links between systems for specific functions.
  - Command-driven or menu-driven interfaces.
- **Third Generation (GUI, Integration, Client-Server):**
  - Fully integrated systems with relational databases.
  - Client-server architecture.
  - Color GUI with windows, icons, menus, and direct manipulation.
  - Embodiment of open system interconnection standards.
- **Fourth Generation (Web Architecture, Unicode, Digital Media):**
  - Web-centric architecture for access over the internet.
  - Unicode compliance for multilingual support.
  - Multimedia graphical user interfaces.
  - Access to multiple sources from single interface.
- **Fifth Generation (Cutting-Edge Technologies):**
  - Web-scale management, cloud computing, and web 2.0 features.
  - AJAX, API, and linked open data technologies.
  - Rise of open-source ILS and open standards implementation.

LIST OF LIBRARY MANAGEMENT SOFTWARES -OPEN SOURCE

Software	Developer	Year of release	Latest Release	Written in	Main purpose	License
Koha	Koha Community	2000	2021	Perl	ILS	GPL-3.0-or-later
PMB	PMB development team	2002	2022	PHP	ILS	CECILL-2.0
NewGenLib	Verus Solutions	2005	2015	Java	ILS	GPL
Evergreen	Georgia Public Library Service	2006	2021	Perl, C, XUL	ILS	GPL-2.0-or-later
OpenBiblio	OpenBiblio development team	2002	2018	PHP	ILS	GPL-2.0-or-later

CATEGORISATION OF ILSS BY DISTRIBUTION POLICY

Types of Library	Distribution policy	Systems
Large Library	Close source (Commercial)	VIRTUA ILS, SLIM 21, AUTOLIB
Medium Range	Close source (Commercial)	LibSys, SOUL, NIRMALS
Small Library	Close source (Freeware)	ABCD, e-Granthalaya, LAMP, WEBLIS, Librarian
	Open source (Freely available)	Evergreen ILS, Koha (version 2.x), Emilda, Koha (version 3.x), NewGenLib, PHPMyLibrar

RDBMS AND DBMS

What they are:

- **DBMS:** Database Management System - generic term for software managing databases.
- **RDBMS:** Relational Database Management System - specific type of DBMS based on tables and relationships.

Relational Database: A Short History
Founded: 1970 by E.F. Codd at IBM Concept: Data stored in tables (relations) with specific rules and operators for manipulation.
Early Implementations:

- University of Michigan (1969)
- Massachusetts Institute of Technology (1971)
- IBM UK Scientific Centre (1970s)

Commercialization:

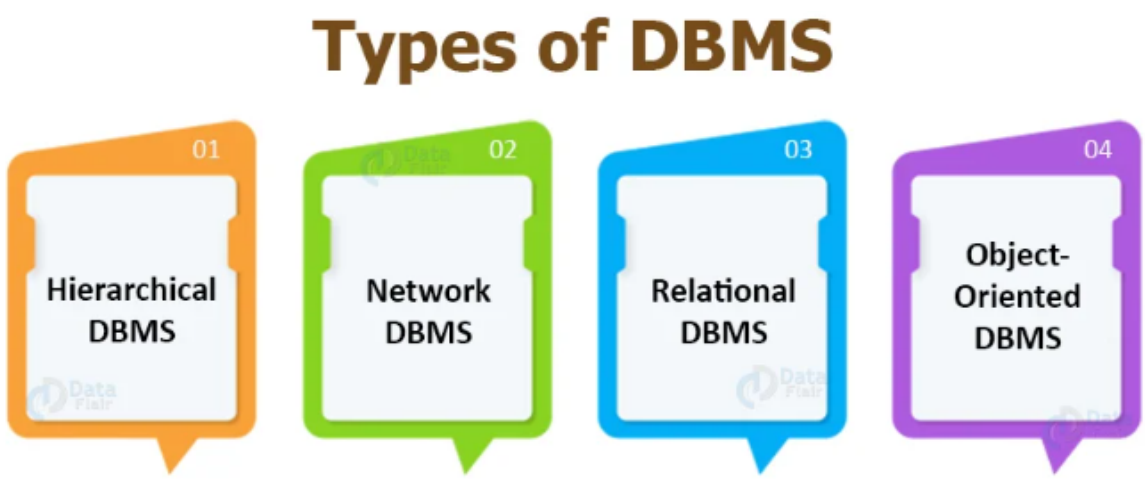
- First RDBMS sold: Multics Relational Data Store (1976)
- Followed by Oracle (1979), Ingres, IBM DB2, etc.
- 4D (1987) for Macintosh

Debates:

- Strict definition based on Codd's 12 rules vs. practical implementations (most RDBMS don't conform to all rules)
- "Truly-relational" vs. "pseudo-relational" systems

COMAPARISION -RDBMS AND DBMS

Feature	DBMS	RDBMS
Data structure	Hierarchical	Tables with rows and columns
User access	Single user	Multiple users
Hardware/software requirements	Lower	Higher
Data size	Smaller volumes	Any size
ACID compliance	No	Yes
Distributed databases	No support	Full support
Data relationships	No focus	Manage relationships within tables
Normalization	Not supported	Supported



1. Hierarchical Database

These DBMS employ parent and child relationships to store the data. Hierarchical DBMS is wide.

They store data in a tree-like structure so that it is easy to find and use. Similarly, the configuration of the DBMS is present in the nodes of the tree.

2. Network DBMS

Network DBMS supports many-to-many relations which results in complex database structures.

RDM Server is a major example of the network DBMS.

3. Relational DBMS

Relational DBMS stores data using the database relationships in the form of tables, also known as relations or tuples.

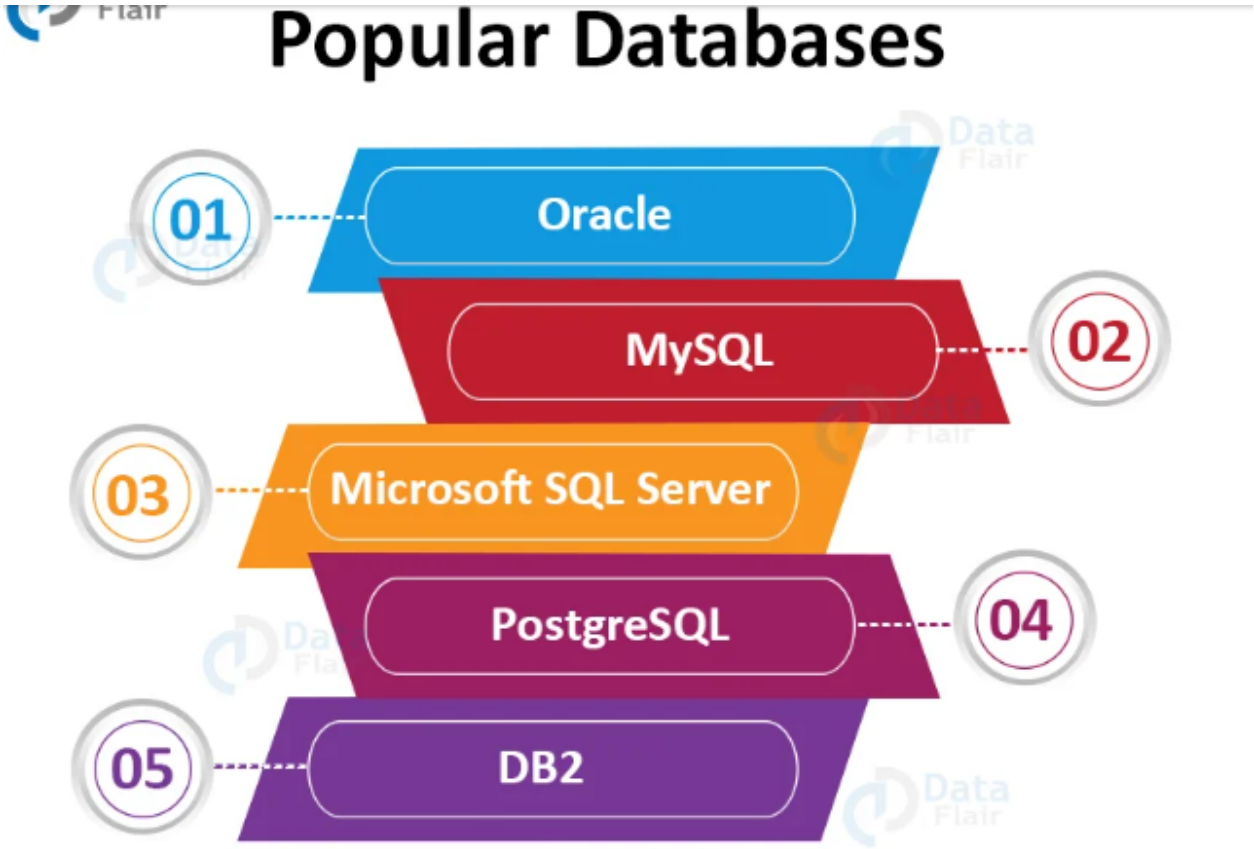
They do not support many to many relationships and have pre-defined data types that they can support. They are the most popular DBMS type in the industry.

Example: Oracle, MySQL, MS SQL, etc.

4. Object-Oriented Relational DBMS

This DBMS supports the storage of miscellaneous data types. They store data in the form of objects.

The object has attributes (i.e., name, id, gender, etc.) and the logic for what needs to be done with the data. Example: PostgreSQL.



XAMO(CORRECT IS XAMPP)

XAMPP is an acronym that stands for **X** (cross-platform), **A**pache (web server), **M**ySQL (database), **P**HP (programming language). It is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages.

APACHE, MYSQL, PHP

Software	Year of Creation	Founder(s)
Apache	1993	Apache Group (later Apache Software Foundation)
MySQL	1995	Michael Widenius (Monty), David Axmark, Allan Larsson
PHP	1993	Rasmus Lerdorf

DIGITAL PRESERVATION (DP)- INTRODUCTION, DILEMMAS AND CRITICAL CHALLENGES

In the library science world, digital preservation (DP) has become an essential yet complex endeavor. It's the process of ensuring long-term accessibility, authenticity, and usability of digital information. While crucial for safeguarding our digital heritage, DP presents unique challenges and dilemmas.

Introduction:

- Digital information permeates every aspect of our lives, from research publications and historical records to personal memories and cultural artifacts.
- Unlike physical objects, digital information is susceptible to degradation, obsolescence, and accidental deletion.
- DP ensures the continued accessibility and trustworthiness of this information for future generations.

Dilemmas:

1. Balancing Access vs. Privacy: Ensuring accessibility while protecting sensitive information.
2. Dark Archives vs. Active Curation: Deciding when to prioritize long-term storage vs. active management.
3. Born-Digital vs. Digitized Materials: Preserving different types of digital objects with varying complexities.
4. User Needs vs. Technical Feasibility: Catering to diverse user needs within technical limitations.
5. Community Participation vs. Centralized Control: Balancing democratic access with effective governance.
6. Cultural Diversity: Preserving culturally specific information formats and languages.
7. Personal vs. Institutional Responsibility: Defining individual and organizational roles in DP.
8. Open Access vs. Intellectual Property Rights: Balancing free access with fair compensation for creators.
9. Short-Term vs. Long-Term Planning: Addressing immediate needs while ensuring future accessibility.
10. Evolving Legal Frameworks: Keeping pace with changing legislation impacting digital information.

Critical Challenges:

1. Funding and Resource Allocation: Securing sustainable funding for long-term preservation efforts.
2. Scalability and Interoperability: Managing and accessing vast amounts of diverse digital data.
3. Technological Dependence: Mitigating risks associated with reliance on specific technologies.
4. Disaster Preparedness and Recovery: Implementing robust protection against accidental and intentional data loss.
5. Skill Development and Training: Educating and upskilling professionals in DP best practices.
6. Community Engagement and Partnerships: Building collaborative networks for knowledge sharing and resource pooling.
7. Metrics and Evaluation: Developing effective means to assess DP efforts and impact.
8. Awareness and Advocacy: Raising awareness of the importance of DP among stakeholders.
9. Evolving Technological Landscape: Adapting to ongoing advancements and their impact on preservation strategies.
10. Ethical Considerations: Addressing emerging ethical issues surrounding digital information and its preservation.

Concepts, Terminology, and Standards

Digital Preservation: Concepts, Terminology, and Standards

Concepts:

1. **Bitstream vs. Information Object:** Differentiating raw data from its intended meaning and structure.
2. **Authenticity and Integrity:** Ensuring information remains unchanged and verifiable over time.
3. **Ingest and Selection:** Bringing digital objects into the preservation system and choosing what to preserve.
4. **Emulation vs. Migration:** Reinterpreting older formats vs. converting them to current ones.
5. **Dark Archives vs. Active Curation:** Storing for long-term access vs. actively managing and using data.
6. **Metadata:** Descriptive information about the digital object itself.
7. **Provenance:** Tracking the origin and history of the digital object.
8. **Sustainability:** Long-term viability of preservation solutions.
9. **Access Control and Security:** Balancing accessibility with information protection.
10. **Obsolescence and Long-Term Accessibility:** Addressing risks of evolving formats and technologies.

Terminology:

1. **Digital Object Identifier (DOI):** Unique identifier for digital content.
2. **Preservation Metadata Format (PREMIS):** Standard for recording preservation actions.
3. **Open Archival Information System (OAIS):** Reference model for archival systems.
4. **Representation Information Format (RIF):** Standard for describing digital object versions.
5. **Emulation:** Software-based interpretation of older formats.
6. **Migration:** Conversion of digital objects to new formats.
7. **Fixity:** Ensuring no unauthorized changes occur to the digital object.
8. **Bit Preservation:** Keeping the raw data bits intact.
9. **Ingest:** Bringing digital objects into the preservation system.
10. **Curation:** Managing and maintaining digital objects over time.

Standards:

1. **MetaArchive Preservation Trust (MAPTRUST):** Non-profit providing preservation certification.
2. **Library of Congress Digital Preservation:** Resources and best practices.
3. **Digital Preservation Coalition (DPC):** International collaboration on DP issues.
4. **National Digital Stewardship Alliance (NDSA):** US-based alliance for digital stewardship.
5. **International Council on Archives (ICA):** Guidelines and recommendations for DP.
6. **OASIS Reference Model for an Open Archival Information System (OAIS):** Provides a framework for archival systems.
7. **PREMIS:** Standardized vocabulary for preservation metadata.
8. **METS (Metadata Encoding and Transmission Standard):** Standard for packaging digital objects and metadata.
9. **NARA Electronic Records Archive (NARA ERA):** US standard for managing electronic records.
10. **ISO 14523 and 16363:** Standards for managing electronic records and metadata.

Systems, Integrity, Stability, and Authenticity, Digital Preservation Frameworks,

Systems:

1. **Digital Repository:** Secure storage and management platform for digital objects.
2. **Emulation Software:** Interprets and runs older software and hardware environments.
3. **Migration Software:** Converts digital objects to new formats.
4. **Metadata Management Systems:** Store and manage information about digital objects.
5. **Authentication Systems:** Verify the identity and trustworthiness of digital objects.
6. **Distributed Storage Systems:** Provide geographically diverse storage for redundancy.
7. **Cloud Preservation Services:** Utilize cloud infrastructure for digital preservation.

- **Open-Source Preservation Tools:** Freely available software for DP tasks.
- **Community-Driven Platforms:** Collaborative platforms for shared preservation efforts.
- **Institutional Repositories:** Preserve research outputs and other institution-specific materials.

Integrity, Stability, and Authenticity:

- **Fixity Checks:** Regularly verifying that digital objects haven't changed unintentionally.
- **Checksums:** Unique identifiers used to detect changes in digital content.
- **Bitstream Preservation:** Guaranteeing the long-term preservation of the raw data bits.
- **Emulation and Migration:** Ensuring continued access and interpretation of digital objects over time.
- **Metadata Management:** Recording information about origin, modifications, and context to ensure authenticity.
- **Provenance Tracking:** Recording the history and chain of custody of digital objects.
- **Trusted Repositories:** Ensuring secure and reliable storage environments.
- **Redundancy and Disaster Recovery:** Protecting against data loss from equipment failures and natural disasters.
- **Standardized Practices:** Applying consistent procedures to minimize errors and ensure data integrity.
- **Regular Audits and Review:** Periodically assess the effectiveness of preservation measures.

Digital Preservation Frameworks:

- **Open Archival Information System (OAIS):** Reference model for archival systems.
- **Digital Curation Centre (DCC) Curation Lifecycle Model:** Framework for managing digital objects over time.
- **Library of Congress Digital Preservation Framework:** US-based framework for libraries and archives.
- **CLAIRMONT Model:** Focuses on long-term access and sustainability.
- **PREMIS Framework:** Standards for capturing and sharing preservation metadata.
- **META Schema Standard:** Standard for structured description of digital objects.
- **Trustworthy Repositories Audit Methodology (TRAM):** Evaluates trustworthiness of digital repositories.
- **NDSA Levels of Digital Preservation:** Defines different levels of preservation commitment.
- **NARA Electronic Records Archive (NARA ERA):** US standard for managing electronic records.
- **International Standards Organization (ISO) Standards:** Various standards related to digital preservation (e.g., ISO 16363, ISO 14523).

Understanding the digital object, Strategies for digital preservation, Preservation planning

Understanding the Digital Object:

- **Components:** Digital objects consist of data, metadata, and context.
  - **Data:** The raw bits of information making up the content.
  - **Metadata:** Descriptive information about the data (e.g., author, format, creation date).
  - **Context:** The environment and relationships surrounding the object (e.g., software used, hardware platform).
- **Complexity:** Unlike physical objects, digital objects are inherently complex and dynamic, requiring nuanced preservation approaches.
- **Challenges:** Understanding the digital object requires expertise in various fields, including technology, information science, and archival principles.

Strategies for Digital Preservation:

- **Selection:** Identifying and prioritizing objects for preservation based on their value and significance.
- **Ingest:** Bringing objects into the preservation system, including metadata capture and integrity checks.
- **Storage:** Securely storing objects in reliable and accessible locations, considering redundancy and disaster recovery.
- **Fixity:** Ensuring the data remains unchanged over time through checksums and other verification methods.
- **Representation:** Maintaining access by preserving the original format or migrating to new formats as needed.
- **Metadata Management:** Maintaining accurate and complete metadata throughout the preservation lifecycle.
- **Authentication:** Verifying the authenticity and integrity of the digital object.
- **Access:** Providing authorized users with access to the preserved object while respecting access restrictions.

Preservation Planning:

- **Assessment:** Identifying risks and challenges specific to the collection and resources available.
- **Policy Development:** Establishing policies and procedures for selection, ingest, storage, access, etc.
- **Resource Allocation:** Securing funding, personnel, and technology for long-term preservation efforts.
- **Collaboration:** Partnering with other institutions and stakeholders to share expertise and resources.
- **Metrics and Evaluation:** Regularly monitoring and evaluating the effectiveness of preservation efforts.

ADDITIONAL NOTES

PRESERVATION METADATA: IMPLEMENTATION STRATEGIES (PREMIS)

PREMIS: Preserving Your Digital Heritage

Origin and Purpose:

- The **PREMIS Working Group** was formed to advance digital object preservation through metadata frameworks.
- It built upon the earlier **Preservation Metadata Framework (PMF)** initiated by OCLC and RLG.
- Their goal was to create a **core data dictionary** and best practices for managing preservation metadata.

Key Milestones:

- **2001-2002:** PMF working group identified needed metadata elements.
- **2003:** PREMIS tasked with developing an implementable data dictionary.
- **2004:** Working group published a report on current preservation practices.
  - **May 2005:** Release of **Data Dictionary for Preservation Metadata 1.0**:Comprehensive resource for implementing preservation metadata.
  - Includes data model, glossary, usage examples, and XML schema.
- **June 2015:** Release of current **Version 3.0**.

Technical Foundation:

- PREMIS data dictionary builds upon the **Open Archival Information System (OAIS)** reference model.
- OAIS provides a conceptual structure for archived objects and their metadata.
- PREMIS translates this framework into practical, implementable units.

Benefits:

- **Standardized:** Enables consistent documentation and exchange of preservation information.
- **Interoperable:** Facilitates data sharing and collaboration across repositories.
- **Sustainable:** Ensures long-term access and understanding of digital objects.

The PREMIS data model consists of four interrelated entities:

1. Object (divided into three subtypes)
2. Event
3. Agent
4. Rights

With each semantic unit in the data dictionary categorized in one of these areas.

METADATA STANDARD LIST 1

Metadata Standard	Description
PREMIS	Preservation Metadata: Implementation Strategies, an international standard for metadata to support the preservation of digital objects.
Dublin Core	A simple yet powerful standard for cross-domain information resource description.
Encoded Archival Description (EAD)	A standard for encoding archival finding aids using XML.
Visual Resources Association (VRA) Core	A standard for the description of works of visual culture as well as the images that document them.
Categories for the Description of Works of Art (CDWA)	Describes the content of art databases by articulating a conceptual framework for describing and accessing information about works of art, architecture, other material culture, groups and collections of works, and related images.
Machine-Readable Cataloging (MARC)	A standard for encoding a description of an item wherein a computer can interpret and manipulate the data.
Metadata Object Description Schema (MODS)	A schema for a bibliographic element set that may be used for a variety of purposes, and particularly for library applications.

METADATA STANDARD LIST 2

Name	Focus	Description
FOAF	Friend of a Friend	The Friend of a Friend (FOAF) project aims to create a Web of machine-readable homepages describing people, their connections, and activities.
Dublin Core	Networked resources	Dublin Core is an interoperable online metadata standard focused on describing networked resources.
DOI	Networked resources	Digital Object Identifier provides a system for identifying and managing information on digital networks, ensuring persistence and interoperability.
RDF	Web resources	Resource Description Framework is a method for modeling information in web resources, enabling the semantic web.
DDI	Archiving and Social Science	The Data Documentation Initiative is an international effort to establish a standard for technical documentation describing social science data.
EAD	Archiving	Encoded Archival Description is a standard for encoding archival finding aids using XML, commonly used in archival and manuscript repositories.
MARC	Librarianship	MAchine Readable Cataloging is a standard for bibliographic and related information in machine-readable form, widely used in library cataloging systems.
METS	Librarianship	Metadata Encoding and Transmission Standard is an XML schema for encoding descriptive, administrative, and structural metadata regarding objects within a digital library.
MODS	Librarianship	Metadata Object Description Schema is a schema for bibliographic metadata, commonly used in library applications.
MADS	Librarianship	Metadata Authority Description Schema is a schema for authority control used in library applications to manage names and geographical areas.
XOBIS	Librarianship	XML Organic Bibliographic Information Schema is an XML schema for modeling bibliographic data, aiming to improve on MARC data representation.
RAD	Librarianship and archiving	The Rules for Archival Description is the Canadian archival descriptive standard for describing archival materials.

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PAPER 2 -UNIT 5

RPSC COLLEGE LIBRARIAN

Saket Sharma

Unit 5

Research Data Management- Types of data and sources. Storing, Curation and Preservation of Research Data: Documentation and Metadata. Data Management Plan and related tools. FAIR Principles. Data Privacy and Ethics.

Research Data Management Services- Concept of Research Data Management Services, Need and benefits. Data repositories. Starting Research Data Management Services. Planning and organizing the RDM services. Promoting the RDM services. Evaluating and refining the RDM services

Web Technology and Web Based Services- Web 2.0 and 3.0 - Library 2.0- Concept, Characteristics, Components; Instant Messaging, RSS Feeds, Podcasts, Vodcasts etc

Web – Scale Discovery Services. Mobile based Library Services and Tools – Library Apps, Mobile Library Instructions, SMS Alerts, Geo-Location, Reference Enquiry

Social Web Networks and Content Management Systems. Collaborative services Social Networks, Social Tagging. Content Management Systems. Research Information Management System. Research Information Management Tools (IRINS, VIVO).

RESEARCH DATA MANAGEMENT- TYPES OF DATA AND SOURCES

Research data is the raw information collected during a research project. It can come in many forms, such as:

- Numbers: Measurements, survey responses, experiment results, etc.
- Text: Interview transcripts, documents, notes, etc.
- Images: Photos, scans, microscopy images, etc.
- Audio: Recordings of interviews, focus groups, etc.
- Video: Recordings of experiments, observations, etc.

Sources of Research Data

Types of Research Data:

- Primary data: This is data collected firsthand by researchers specifically for their study. Examples include surveys, experiments, interviews, and observations.
- Secondary data: This is data that has already been collected by someone else, such as government statistics, census data, or published research articles.

- **Primary Data:** This is data collected by the researcher for their specific project through:
  - Experimental data: Gathered through controlled experiments or observations.
  - Survey data: Obtained through questionnaires or interviews.
  - Observational data: Collected by directly observing a phenomenon.
  - Textual data: Includes documents, transcripts, and other written materials.
  - Visual data: Photos, videos, and other visual recordings.
  - Audio data: Recordings of interviews, speeches, or other sounds.

- **Secondary Data:** This is data collected by others and repurposed for your research, such as:
  - Government data: Census records, economic reports, health statistics, etc.
  - Organizational data: Company reports, market research data, internal reports.
  - Academic databases: Collections of journal articles, conference proceedings, etc.
  - Social media data: Publicly available posts, comments, and activity.
  - Open-source data: Datasets shared freely by researchers or organizations.

Choosing the Right Data Source:

The best source depends on your research question, resources, and expertise. Consider factors like:

- Specificity: Does the data directly address your research question?
- Accuracy: Is the data reliable and trustworthy?
- Accessibility: Can you easily access and use the data?
- Cost: Are there any fees associated with obtaining the data?
- Ethical considerations: Does using this data raise any ethical concerns?

Examples of Research Data Sources:

- Scientific research laboratories: Generate experimental data in various fields.
- National statistical agencies: Provide census data, economic indicators, etc.
- Social media platforms: Offer publicly available data on user behavior and trends.
- Academic institutions: Maintain libraries and repositories of journals, articles, and datasets.
- Commercial data providers: Sell access to specific datasets or market research reports.
- Public archives and libraries: Hold historical documents, photographs, and other resources.

STORING, CURATION AND PRESERVATION OF RESEARCH DATA: DOCUMENTATION AND METADATA.

Digital Preservation Metadata: Key Points

1. Introduction:

- This module focuses on **preservation metadata**, essential for long-term digital preservation.
- Without it, digital objects lose context and risk being lost entirely.
- This section will cover metadata models, standards, functions, storage management patterns, and global initiatives.

2. What is Preservation Metadata?

- Structured information needed to manage and preserve digital objects.
- Crucial for establishing **authenticity, integrity, provenance, and trustworthiness**.
- Enables various preservation services like conservation, digitization, and access.

3. Types of Preservation Metadata:

- **Technical metadata:** Describes file format, size, encoding, etc., ensuring future access.
- **Descriptive metadata:** Provides context like title, author, creation date, etc., aiding discovery and understanding.
- **Administrative metadata:** Tracks actions taken on the object, like migrations or fixes, ensuring accountability and transparency

OPEN ARCHIVAL INFORMATION SYSTEM (OAIS)

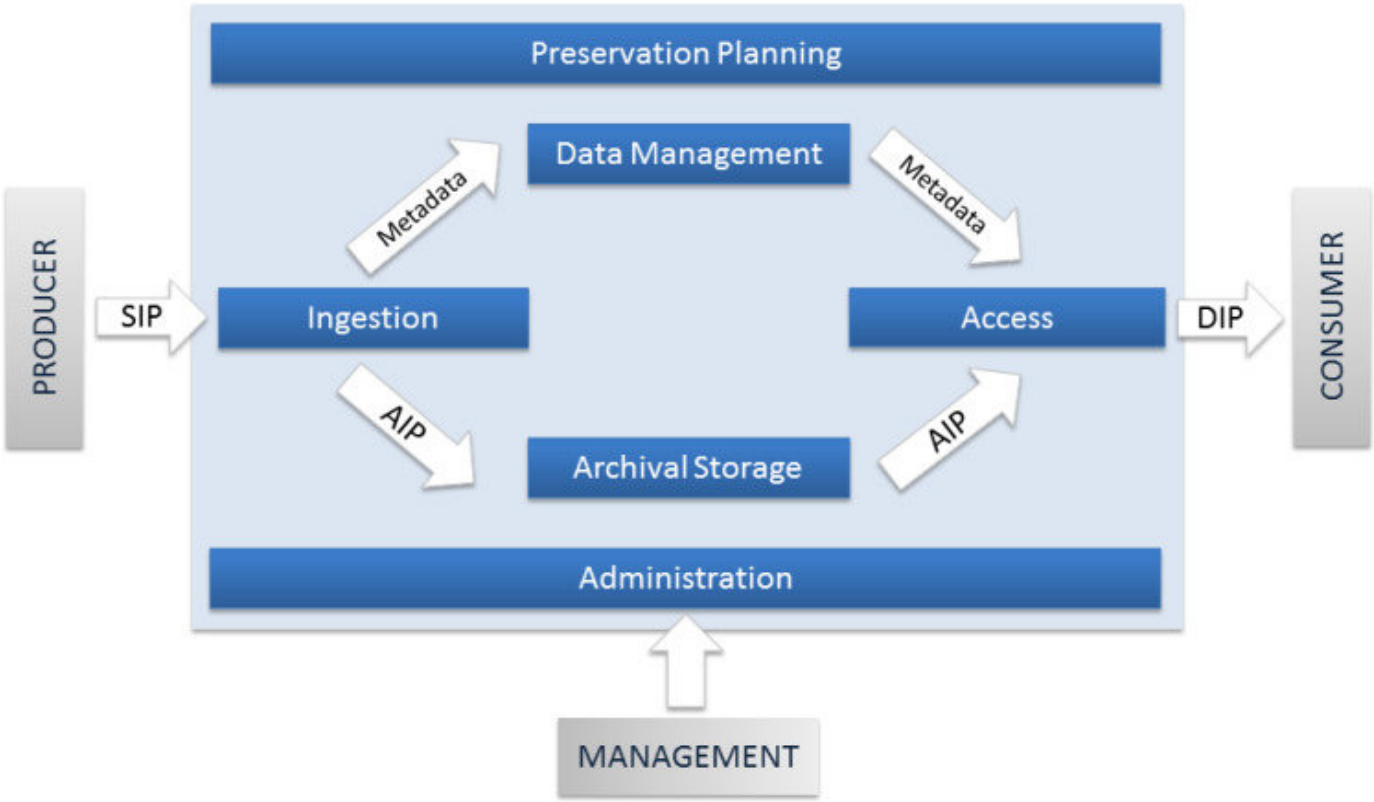
1. Overview:

- The OAIS functional model defines six key components responsible for managing and preserving digital information:

2. Functional Entities:

- **Ingest:**
  - Receives information from producers ("information producers").
  - Validates and prepares it for storage ("packages it for storage").
  - Creates a Submission Information Package (SIP) from the received information.
  - Transfers the created Archival Information Package (AIP) to storage.
- **Archival Storage:**
  - Stores, maintains, and retrieves AIPs.
  - Manages long-term storage of AIPs.
  - Performs migrations of AIPs as needed to ensure format compatibility.
  - Detects and corrects errors in AIPs.
  - Provides requested AIPs to the Access function.
- **Data Management:**
  - Manages descriptive information about the AIPs ("Descriptive Information").
  - Tracks system information crucial for archive operation.
  - Maintains a database containing all archive information.
  - Generates reports for other functions.
  - Updates the database as needed.
- **Administration:**
  - Oversees daily archive operations.
  - Establishes agreements with information producers.
  - Manages system engineering and audits incoming SIPs.
  - Develops policies and standards for the archive.
  - Provides customer service and facilitates communication between management and users.

- **Preservation Planning:**
  - Ensures long-term accessibility and understanding of archived information.
  - Develops detailed preservation and migration plans.
  - Monitors technological advancements and analyzes potential risks.
  - Recommends content updates and migrations when necessary.
- **Access:**
  - Provides a user interface for accessing information from the archive.
  - Generates Dissemination Information Packages (DIPs) from requested AIPs.
  - Delivers DIPs to authorized users.



Conceptual diagram of working of OAIS

Source : https://images.app.goo.gl/SX12VA1RFcLRzUk5A

Important Points of the OAIS Reference Model:

What is it?

- A reference model for building and maintaining long-term digital archives.
- Defined by ISO standard 14721:2012.
- Originally developed for space agencies, now widely used across disciplines.

Key Features:

- **Focuses on "long-term preservation":** Ensures digital information remains usable despite changing technology and communities.
- **Applicable to various archive types:** Open, closed, restricted, etc.
- **Conceptual framework:** Doesn't specify specific technologies or platforms, but sets best practices for activities involved in digital archiving.
- **"Open" in OAIS:** Refers to the open development process, not necessarily open access to the information.
- This reference model is defined by recommendation **CCSDS 650.0-B-2 of the Consultative Committee for Space Data Systems**

Software Architecture Model

- Presented by **Frank Obermeit**
- State Archives of Saxony-Anhalt, Germany
- Unveiled on **September 22, 2020**
- Fully implements **Open Archival Information System (OAIS)** reference model
- Appliance developed since **October 2020**
- Based on **de facto and de jure standards**
- Relies on **open-source products**
- Key standards: **BPMN, REST, OIDC**
- Features: **Scalability, Distributability, Extensibility**
- Suitable for organizations of **different sizes**

PREMIS (PRESERVATION METADATA: IMPLEMENTATION STRATEGIES)

Year: 2003

- **OCLC and RLG establish Preservation Metadata: Implementation Strategies (PREMIS).**
- **International working group formed with over thirty experts.**
- **Goals: Define a core set of implementable preservation metadata elements and identify strategies for managing them.**

Year: September 2004

- **PREMIS releases a survey report on current practices and emerging trends in preservation metadata management.**

Year: May 2005

- **Final report of the PREMIS Working Group is released.**

PREMIS Data Dictionary:

- **Comprehensive resource for implementing preservation metadata in digital archiving systems.**
- **Defines core preservation metadata and provides guidelines for management and use.**

XML Schema:

- **Developed by PREMIS to support institutions in managing and exchanging preservation metadata.**

PREMIS Data Model:

- Consists of five entities associated with the digital preservation process:
  - Intellectual Entity
  - Object
  - Event
  - Agent
  - Rights

Each entity described by semantic units, representing discrete pieces of information recorded as metadata.

Data Dictionaries & Schemas

- Latest PREMIS Version 3.0 (PREMIS Data Dictionary (full document), Version 3.0 and Updated on : November 2015.

METS -METADATA ENCODING AND TRANSMISSION STANDARD.

Metadata Encoding and Transmission Standard (METS)

- Metadata standard for encoding **descriptive, administrative, and structural metadata** in digital libraries.
- Expressed using **XML schema** language of the **World Wide Web Consortium (W3C)**.
- Maintained as part of the **MARC standards** by the **Library of Congress**.
- Developed as an initiative of the **Digital Library Federation (DLF)**.
- **Four Major Constituent Sections** of a METS file: i) **File inventory**: Lists all files associated with the digital object. ii) **Administrative metadata section** iii) **Descriptive metadata section** iv) **Structural map**: Hierarchically indicates how components of the item relate to each other.

- **Flexibility** in implementation:
  - Practical implementation can be flexible, compatible with any system capable of handling XML documents.
- **Associating Behaviors or Services**:
  - METS enables the association of digital objects with behaviors or services.

The 7 sections of a METS document:

```
<mets>
  <metsHdr/>
  <dmdSec/>
  <amdSec/>
  <fileSec/>
  <structMap/>
  <structLink/>
  <behaviorSec/>
</mets>
```

Sections of a METS Document

- **METS Header (metsHdr)**:
  - Contains metadata about the METS document itself, such as creator and editor details.
- **Descriptive Metadata (dmdSec)**:
  - Contains embedded or externally linked metadata describing the digital object.
  - Multiple instances of internal and external descriptive metadata may be included.
- **Administrative Metadata (amdSec)**:
  - Provides information on file creation, intellectual property rights, and provenance.
  - Includes metadata about the original source object and file management details.
- **File Section (fileSec)**:
  - Lists all files comprising the electronic versions of the digital object.
  - Files may be grouped within fileGrp elements to organize by object version.
- **Structural Map (structMap)**:
  - Defines hierarchical structure for the digital object and links elements to associated content and metadata.
  - This section is mandatory for all METS documents.
- **Structural Links (structLink)**:
  - Records hyperlinks between nodes in the Structural Map, useful for archiving websites.
- **Behavioral (behaviorSec)**:
  - Associates executable behaviors with content in the METS object.
  - Mechanism elements identify modules of executable code implementing abstract behaviors.
- **METS Editorial Board Seeks Feedback on METS 2**
- **Summary:**
- The METS Editorial Board is requesting feedback on METS 2, a revised version of the Metadata Encoding and Transmission Standard (METS).
- METS 2 aims to be simpler, lighter, and more flexible than METS 1.

NATIONAL DIGITAL PRESERVATION PROGRAM

National Study Report on Digital Preservation Requirements of India

- **Initiated**: April 2010 by Ministry of Electronics and Information Technology, Government of India.
- **Assigned to**: Human-Centred Design & Computing Group, C-DAC, Pune, with expertise in heritage computing.
- **Objective**: Present a comprehensive study of India's digital preservation landscape compared to international trends and recommend a National Digital Preservation Program involving all stakeholders.
- **National Expert Group**: Technical experts from 24 organizations across various domains, including e-governance, archives, cultural heritage, health, science, education, banking, etc.
- **Volumes**:
  - **Volume I**: Recommendations for National Digital Preservation Program of India.
  - **Volume II**: Position Papers by the National Expert Group Members.
- **Contents**: Overview of international digital preservation projects, study of legal imperatives, technical challenges, and standards. Recommendations for the National Digital Preservation Program.
- **Key Recommendation**: Harmonize Public Records Act, Right to Information Act, Indian Evidence Act, Copyright Act, and other related Acts with the Information Technology Act to address digital preservation needs.
- **Impact**: Indian judiciary initiated drafting of electronic evidence rules under the Indian Evidence Act in 2018, aligning with the recommendation. A Joint Committee of High Court Judges visited C-DAC, Pune to examine technical aspects related to electronic evidence rules.

Centre of Excellence for Digital Preservation(C-DAC)

- **Launch Date**: April 2011, as recommended in the national study report.
- **Funded by**: Ministry of Electronics and Information Technology, Government of India.
- **Project Awarded to**: Human-Centred Design & Computing Group, C-DAC Pune, India.

Digital Preservation Standard and Guidelines

- **Development Purpose**: Assist local data-intensive projects in meeting demanding standards like ISO 16363 for Audit and Certification of Trusted Digital Repositories.
- **Notification by Government**: Ministry of Electronics and Information Technology, Government of India, notified the standard.
  - Notification No. 1(2)/2010-EG-II dated December 13, 2013, applicable to all e-governance applications in India.

e-Governance Standard for Preservation Information Documentation (eGOV-PID) of Electronic Records

- Provides:
  - Standard metadata dictionary and schema for capturing preservation metadata automatically.
  - Cataloging, enclosure, provenance, fixity, representation, digital signature, and access rights information.
- Aids in producing an acceptable Submission Information Package (SIP) for an Open Archival Information System (OAIS) per ISO 14721:2012.

Digital Preservation Tools and Solutions

- **Challenges**: Difficulty in implementing digital preservation standard due to lack of required tools and solutions.
- **Supporting Tools and Solutions**: Developed to complement the standard and guidelines, aiding memory institutions and records creating organizations in long-term preservation.
- **DIGITĀLAYA (डिजिटालय) Software Framework**:
  - Developed by the project team at C-DAC Pune.
  - Customizable for various domains, data types, and application contexts including:
    - E-records management & archival
    - Large volume of e-governance records
    - Audiovisual archives
    - Digital libraries / document archives

- Designed and developed following the CCSDS Open Archival Information System (OAIS) Reference Model, ISO 14721: 2012.

- **Digital Preservation Tools**:
  - **e-SANGRAHAN (ई-संग्रहण)**: E-acquisition tool
  - **e-RUPĀNTAR (ई-रूपांतर)**: Pre-archival data processing tool
  - **DATĀNTAR (डेटांतर)**: E-records extraction tool
  - **SUCHI SAMEKAN (सूची समेकन)**: Metadata importing and aggregation tool
  - **META-PARIVARTAN (मेटा-परिवर्तन)**: Any to any metadata conversion tool
  - **DATA HASTĀNTAR (डेटा-हस्तांतर)**: Data encryption and transfer tool
  - **PDF/A Converter Tool**: Ensures compatibility for long-term preservation.

Pilot Digital Repositories

- **Development and Collaboration**: Various pilot digital repositories developed in collaboration with domain institutions like:
  - Indira Gandhi National Centre for Arts, New Delhi
  - National Archives of India, New Delhi
  - Stamps and Registration Department, Hyderabad
  - e-District
  - C-DAC Noida collaborated with district courts of Delhi for e-Court Solution.
- **Objectives**:
  - Understand different data sets in terms of metadata, digital objects, file formats, authenticity, access control, and user requirements.
  - Identify opportunities for tool and solution development to address domain-specific requirements.
  - Involve stakeholders in the digital preservation process.
  - Generate proof of concept by deploying solutions in domain institutions.

ISO 16363 Certified Trusted Digital Repository

- National Cultural Audiovisual Archive (NCAA) at IGNCA, New Delhi, established using DIGITĀLAYA.
- Accredited by Primary Trustworthy Digital Repository Authorization Body (PTAB), UK.
- Awarded certified status as Trusted Digital Repository as per ISO 16363, first in India and globally..

Contribution to UNESCO Standard Setting Instrument on Preservation of Digital Heritage

- Dr. Dinesh Katre represented India in the UNESCO International Experts Consultative Meet on Preservation and Access, contributing to the drafting of the Standard Setting Instrument.
- UNESCO General Conference adopted the Recommendation Safeguarding the Memory of the World – Preservation of, Access to, Documentary Heritage in the Digital Era.

LOCKSS ("Lots of Copies Keep Stuff Safe") project	
Developer(s)	**Stanford University**
Stable release	**1.77.6**
License	**BSD style**
Website	**www.lockss.org**

- **LOCKSS Project**
  - **Initiated By**: Under the auspices of Stanford University.
  - **Purpose**: Develops and supports an open-source system for libraries to collect, preserve, and provide access to material published on the Web, focusing on digital preservation.
  - **Acronym**: LOCKSS stands for "Lots of Copies Keep Stuff Safe."
  - **Functionality**: A peer-to-peer network that replicates the way libraries preserve material published on paper.
  - **Original Design**: Primarily designed for scholarly journals but now used for various materials.
  - **Applications**:
    - Used by SOLINET project to preserve theses and dissertations at universities.
    - Used for US government documents.
    - Utilized by the MetaArchive Cooperative program to preserve at-risk digital archival collections.
      - Examples: Electronic Theses and Dissertations (ETDs), newspapers, photograph collections, audio-visual collections.
- **CLOCKSS Project**
  - **Description**: A tax-exempt, 501(c)(3), not-for-profit organization governed by a Board of Directors consisting of librarians and publishers.
  - **Function**: Runs on LOCKSS technology, serving as a controlled version of LOCKSS.
- **CLOCKSSface: Account Management System**
  - Description: A new account management system available to participating publishers and supporting libraries.
  - Purpose: Centralizes information about collaborations and development work for preserving published content.

DATA MANAGEMENT PLAN AND RELATED TOOLS

A **data management plan (DMP)** is a crucial document that outlines the strategy for handling research data throughout its lifecycle. It serves as a roadmap, ensuring the data is organized, documented, stored, secured, and preserved effectively.

Key benefits of a DMP:

- **Improved data quality and organization:** Helps researchers clearly define data types, formats, and collection methods, leading to better data quality and organization.
- **Enhanced collaboration and sharing:** Enables clear communication and collaboration by fostering understanding of data collection, storage, and access procedures.
- **Compliance with funder mandates:** Many funding agencies require researchers to submit a DMP as part of their proposal.
- **Increased data reuse and impact:** Well-managed data is more likely to be discoverable, accessible, and reusable by other researchers, potentially leading to further scientific discoveries and impact.

Developing a DMP:

Several components typically make up a DMP, but the specific details may vary depending on the research project, discipline, and funder requirements. These commonly include:

- **Data description:** Defining the types of data collected, formats, and volume.
- **Data collection methods:** Describing how the data will be collected, including tools and procedures used.
- **Data quality control:** outlining procedures for ensuring data accuracy and integrity.
- **Ethics and legal considerations:** Addressing any ethical concerns or legal restrictions pertaining to data collection and sharing.
- **Storage and security:** Detailing how the data will be stored securely and backed up.
- **Archiving and preservation:** Specifying where and how the data will be archived for long-term preservation and access.
- **Data sharing and access:** Defining who can access the data and under what conditions.

Examples of some Established Data management Plan

NSF Data Management Plan:

- **Requirement:** All NSF grant proposals must include a Data Management Plan (DMP) of no more than two pages.
- **Content of DMP:**
  - Description of data types.
  - Standards for data and metadata format and content.
  - Policies for access, sharing, and re-use.
  - Plans for archiving data.
- **Policy Summarized from NSF Award and Administration Guide (Section 4):**
  - Prompt publication with appropriate authorship.
  - Sharing of data, samples, physical collections, and supporting materials within a reasonable time frame.
  - Sharing of software and inventions.
  - Investigators retain legal rights over intellectual property but must make results, data, and collections available to others.
- **Implementation of Policies:**
  - Through proposal review.
  - Award negotiations and conditions.
  - Support/incentives.

ESRC Data Management Plan

- **Requirement:** ESRC-funded research requires a data management plan for all research award applications involving new data creation.
- **Objective:** To ensure open availability of research data to the scientific community through long-term preservation and high-quality data management.
- **Guidance and Support:**
  - The UK Data Service provides practical guidance on research data management planning, suitable for social science researchers globally.
- **Deposit Requirement:**
  - Award holders must offer data resulting from their grants via the UK Data Service.
  - The UK Data Archive at the University of Essex facilitates data re-use by preserving and making data available to research and teaching communities.

DATA MANAGEMENT TOOLS LIST

Tool Name	Founder(s)	Year Founded
Fedora	Carl Lagoze & Geoffrey Moore	2003
Dataverse	William Michener, Karl Huizinga & Kevin Boyle	2006
Dspace	William Arms, Clifford Lynch & others	2000
EPrints	Stephen Harnad	2000
Dryad	Michael Eisen	2008
Zenodo	OpenAIRE consortium	2013
Figshare	Mark Hahnel	2011
Mendeley Data	Vikram Kumar & Aditya Singh	2013
RDManage	Christopher Jones & Kevin W. Dillon	2012
DataHub	Tom De Godoy & Michael Li	2017

Tool Name	Founder(s)	Initial Release Year	Field
QuestionPro InsightHub	Vivek Bhaskaran	2005	General Research
Google Cloud Platform	Google	2008	General Research
Informatica PowerCenter	Dimitri Shamolin, Gaurav Dhillon	1993	General Research
Dell Boomi	Rick Nucci	2000	General Research
Tableau	Christian Chabot, Chris Stolte, Pat Hanrahan	2003	General Research
Amazon Web Services (AWS)	Amazon	2006	General Research
Talend	Bertrand Diard, Fabrice Bonan	2005	General Research
Profisee	Ian Ahern	2007	General Research
Looker	Lloyd Tabb, Ben Porterfield	2012	General Research
Panoply	Yaniv Leven, Roi Avinoam	2015	General Research
Stitch Data	Jake Stein, Bob Moore	2016	General Research
Microsoft Power BI	Microsoft	2014	General Research
Ataccama ONE	Michal Klaus	2007	General Research
Zotero	Center for History and New Media at George Mason University	2006	Library and Information Science Research
RefWorks	ProQuest LLC	2001	Library and Information Science Research
EndNote	Clarivate Analytics	1988	Library and Information Science Research
Mendeley	Jan Reichelt, Paul Foeckler, and Victor Henning	2008	Library and Information Science Research
Readcube	Digital Science	2011	Library and Information Science Research
Qiqqa	James Jardine	2010	Library and Information Science Research
Docear	Joeran Beel, Stefan Langer, Marcel Genzmehr and Bela Gipp	2013	Library and Information Science Research

REFERENCE DATA MANAGEMENT TOOLS LIST

Software	Developer	First public release	Latest stable release date	Latest stable version	Free software	License
Bebop	ALaRI Institute	2007-11-08	2009-11-10	1.1	Yes	BSD
BibBase	Christian Fritz	2005	2013-07	v3	No	Proprietary
BibDesk	BibDesk developers	2002-04	2023-01-04	1.8.15	Yes	BSD
BibSonomy	University of Kassel	2006-01	2019-12-11	3.9.2	Yes	AGPL, GPL, LGPL
Bookends	Sonny Software	1988 (Mac) / 1983 (Apple II+)	2023-05-06	14.2	No	Proprietary
Citavi	Lumivero	2006-02-13	2023-08-15	6.17.0.0	No	Proprietary
EndNote	Clarivate Analytics	1988	2021-11-30	20.2.1	No	Proprietary
JabRef	JabRef developers	2003-11-29	2023-10-21	5.11	Yes	MIT license
KBibTeX	KBibTeX developers	2005-08	2020-04-26	0.9.2	Yes	GNU GPL
Mendeley	Elsevier	2008-08	2020	1.19.8	No	proprietary (OS API clients exist)
Paperpile	Stefan Washietl, Gregorgy Jordan, Andreas Gruber	2013	Continually updated online	-	No	Proprietary
Papers	ReadCube	2011-10	2023-04-04	v.4.35.2224	No	Proprietary
Pybliographer	pybliographer developers	1998-10-30 (0.2)	2018-04-03	1.4.0	Yes	GNU GPL

refbase	refbase developers	2003-06-03	2014-02-28	0.9.6	Yes	GNU GPL
RefDB	refdb developers	2001-04-25	2007-11-05	0.9.9	Yes	GNU GPL
RefWorks	Ex Libris / ProQuest	2001	2022	4.6	No	Proprietary
Wikindx	Mark Grimshaw, Stéphane Aulery	2003-02	2024-02-19	6.8.2	Yes	ISC license
Zotero	Roy Rosenzweig Center for History and New Media at GMU	2006	2022-06-23	6.0.9	Yes	AGPL

FAIR PRINCIPLES

The FAIR Guiding Principles for Scientific Data Management
Published: 2016 in Scientific Data
Goal: To improve the Findability, Accessibility, Interoperability, and Reusability (FAIR) of digital research data.
Motivation:

- Increasing data volume, complexity, and creation speed necessitate computational support for data management.
- Machine-actionability (automatic discovery, access, interoperation, and reuse) is emphasized.

Framework: The Three-point FAIRification Framework provides practical guidance.
Principles:
Findability: Focuses on the discoverability of data by humans and machines.

- **F1:** Assign a globally unique and persistent identifier to (meta)data.
- **F2:** Describe data with rich metadata (defined by R1 below).
- **F3:** Clearly and explicitly include the identifier of the data in its metadata.
- **F4:** Register or index (meta)data in a searchable resource.

Accessibility: Deals with how users can access the data.

- **A1:** Use a standardized communication protocol to retrieve (meta)data by its identifier.
  - **A1.1:** The protocol should be open, free, and universally implementable.
  - **A1.2:** The protocol should allow for authentication and authorization, if necessary.
- **A2:** Ensure metadata accessibility even when the data is unavailable.

Interoperability: Addresses the ability of data to integrate with other data and applications.

- **I1:** Use a formal, accessible, shared, and broadly applicable language for representing knowledge in (meta)data.
- **I2:** Use vocabularies that adhere to FAIR principles in (meta)data.
- **I3:** Include qualified references to other (meta)data within (meta)data.

Reusability: Focuses on enabling the efficient and effective reuse of data.

- **R1:** Richly describe (meta)data with a plurality of accurate and relevant attributes.
  - **R1.1:** Release (meta)data with a clear and accessible data usage license.
  - **R1.2:** Associate (meta)data with detailed provenance information.
  - **R1.3:** Ensure (meta)data meets domain-specific community standards.

GO-FAIR

GO FAIR Initiative: Promoting FAIR Data Principles
GO FAIR is a collaborative initiative aiming to implement the **FAIR data principles** (Findable, Accessible, Interoperable, and Reusable). It operates through a **bottom-up, stakeholder-driven, and self-governed** approach, fostering an **open and inclusive ecosystem** for individuals and organizations to work together.
GO FAIR's activities are divided into three pillars:

- **GO CHANGE:** Focuses on **socio-cultural change** by promoting FAIR data principles at all levels. This includes setting priorities, policies, and incentives to encourage the adoption of FAIR practices.

- **GO TRAIN:** Coordinates the development of **training resources and programs** to increase **FAIR awareness and equip researchers** with the skills needed to implement FAIR data management plans.
- **GO BUILD:** Drives the development of **technical infrastructure and resources** necessary for FAIR data implementation. This includes designing standards, best practices, and tools to facilitate data findability, accessibility, interoperability, and reusability.

GO FAIR and the Internet of FAIR Data & Services (IFDS):

- **IFDS** is envisioned as an open and distributed network similar to the internet, promoting **maximum freedom of implementation** for all stakeholders.
- It aims to avoid dominance by a few entities by adopting a **decentralized model** with minimal, rigorous standards and protocols, similar to the internet's "hourglass model" (e.g., HTTP).
- This approach allows for **open participation and implementation** by diverse actors, including public and private entities.
- **Scalability and transparency** are crucial aspects of IFDS, ensuring efficient data, tool, and computing resource routing.
- **Anyone** can begin developing applications for IFDS once minimum standards and guidelines are established.

GO FAIR and the European Open Science Cloud (EOSC):

- GO FAIR contributes to the development of **EOSC**, a European initiative aligned with the global vision of IFDS.
- EOSC provides a virtual environment for European researchers to access, store, manage, analyze, and reuse research data.
- The **federated** nature of EOSC emphasizes collaboration and building upon existing infrastructure within member states.
- **Lightweight international guidance** and **freedom for individual implementation** are key principles guiding the development of EOSC, aligning with GO FAIR's core philosophy.

GO CHANGE
GO TRAIN
GO BUILD
Culture
Training
Technology
Socio-cultural change involving relevant stakeholders at all levels relevant for the flourishing of Open Science
Training data stewards capable of designing and implementing proper data stewardship plans including FAIR data and services
Designing and building standards, best practices and infrastructure components needed to create the Internet of Fair Data and Services (IFDS)
GO FAIR International Support and Coordination Office

Source of image:https://www.go-fair.org/go-fair-initiative/:

DATA PRIVACY AND ETHICS

Introduction:

In today's research landscape, data plays a crucial role in generating new knowledge and advancing scientific understanding. However, with the increasing collection and utilization of research data, concerns about data privacy and ethics have become paramount. This section explores these critical aspects of responsible research data management.

Data Privacy:

- **Definition:** Data privacy refers to the rights of individuals to control their personal information and limit its unauthorized access, use, or disclosure.
- **Importance in Research:** Research often involves collecting data from individuals, which may include sensitive information. Protecting this data from unauthorized access, misuse, or breaches is crucial to uphold individual privacy and build trust with participants.
- **Key Points:**
  - **Informed consent:** Obtaining informed consent from participants is essential. This involves clearly explaining what data will be collected, how it will be used, and who will have access to it.
  - **Data minimization:** Collect only the data necessary for the research purpose. Avoid collecting unnecessary personal information.
  - **Anonymization and pseudonymization:** When possible, anonymize or pseudonymize data to remove direct identifiers that link it to individuals.
  - **Secure storage and access:** Implement robust security measures to protect data from unauthorized access, breaches, and loss.

Data Ethics:

- **Definition:** Data ethics refers to the moral principles guiding the collection, storage, analysis, and sharing of research data.
- **Importance in Research:** Ethical research practices are essential to ensure fairness, transparency, and respect for participants' rights and well-being.
- **Key Points:**
  - **Fairness and non-discrimination:** Ensure data collection, analysis, and interpretation are conducted fairly and avoid discrimination based on any individual or group characteristics.
  - **Transparency:** Be transparent about research objectives, data collection methods, and potential risks to participants.
  - **Accountability:** Researchers are accountable for the responsible management and use of research data throughout the research lifecycle.
  - **Beneficence:** Strive to utilize research data for the benefit of society and avoid any potential harm to individuals or communities.

Conclusion:

Data privacy and ethics are intertwined and crucial considerations in research data management. By adhering to these principles, researchers can ensure the responsible use of data, protect individual privacy, and maintain public trust in the research process.

In today's data-driven world, research often relies heavily on the collection, storage, and analysis of personal information. This raises crucial questions about data privacy and ethics, prompting various institutions to issue guidelines, laws, and regulations to guide responsible research data management.

Here are some key principles and examples of institutions that have established frameworks for data privacy and ethics in research:

Informed Consent: Individuals must be informed about the purpose of data collection, how their data will be used, and their rights regarding access and control.

- **Example:** The **Common Rule** by the Department of Health and Human Services (HHS) in the US mandates informed consent for research involving human subjects, including the disclosure of any potential risks or benefits associated with data sharing.

Data Minimization: Researchers should collect only the minimum amount of data necessary to achieve their research objectives.

- **Example:** The **General Data Protection Regulation (GDPR)** of the European Union emphasizes data minimization, requiring organizations to justify the collection and processing of personal data and limiting the retention period.

Transparency: Researchers should be transparent about their data collection practices and how they ensure data security and privacy.

- **Example:** The **FAIR (Findable, Accessible, Interoperable, Reusable)** data principles promote transparency by encouraging researchers to document their data collection and management procedures openly.

Security: Appropriate security measures should be in place to protect personal data from unauthorized access, disclosure, alteration, or destruction.

- **Example:** The **Health Insurance Portability and Accountability Act (HIPAA)** in the US mandates specific security standards for protecting the privacy of patients' health information.

Institutions issuing guidelines and regulations:

- **National and regional regulatory bodies:** GDPR (EU), HIPAA (US), Personal Information Protection and Electronic Documents Act (PIPEDA) (Canada)
- **Professional associations:** American Psychological Association (APA), Association for Computing Machinery (ACM)
- **Funding agencies:** National Institutes of Health (NIH) (US), European Research Council (ERC)

Research Data Management Services

Research Data Management Services (RDMS)-Concept of Research Data Management Services, Need and benefits

Concept: RDMS refers to a variety of services offered to researchers to support them in effectively managing the data generated throughout their research lifecycle. This encompasses the entire data journey, from creation and collection to storage, organization, analysis, preservation, and dissemination.

Need:

- **Compliance:** Meeting funding agency mandates and adhering to ethical research guidelines often require robust data management practices. RDMS helps researchers navigate these requirements.
- **Efficiency:** RDMS provides tools and expertise to streamline data organization, storage, and access, saving researchers valuable time and effort.
- **Reproducibility:** Effective data management practices ensure research is transparent and replicable, fostering trust and scientific progress.
- **Data Sharing:** RDMS facilitates data sharing with collaborators or public repositories, enabling wider research impact and knowledge dissemination.

Benefits:

- **Enhanced research quality and integrity** through robust data management practices.
- **Increased efficiency and productivity** by streamlining data workflows.
- **Improved collaboration and knowledge sharing** through facilitated data sharing.
- **Reduced risk of data loss or misuse** by implementing proper security measures.
- **Alignment with ethical and legal requirements** for data protection and privacy.

By utilizing RDMS, researchers can focus their expertise on generating groundbreaking knowledge while ensuring their data is handled responsibly and effectively.

Data repositories

Data Repositories:

- A data repository, also known as a data library or data archive, is a large database infrastructure that collects, manages, and stores data sets for data analysis, sharing, and reporting. It's a segmented data set used for reporting or analysis. The data repository uses structured organization methods, standardized schemas, and metadata to ensure that the data is always the same and easy to find.

Types of Data Repositories:

- **Data Warehouse:** Aggregates data usually from multiple sources or segments of a business, without the data being necessarily related.

- **Data Lake:** Stores unstructured data that is classified and tagged with metadata.
- **Data Marts:** Subsets of the data repository. These data marts are more targeted to what the data user needs and easier to use.
- **Metadata Repositories:** Store data about data and databases. The metadata explains where the data source, how it was captured, and what it represents.
- **Data Cubes:** Lists of data with three or more dimensions stored as a table.

Benefits of Data Repositories:

- Isolation allows for easier and faster data reporting or analysis because the data is clustered together.
- Database administrators have an easier time tracking problems because data repositories are compartmentalized.
- Data is preserved and archived.

Use of Data Repositories in Libraries:

- Data repositories in libraries can support discovery of data on the web, increase citations and reuse of data, and help meet requirements of funding organizations. They are a centralized place to hold data, share data publicly, and organize data in a logical manner. They can manage, organize, and deposit data, cite data by supplying a persistent identifier, facilitate discovery of data, make data more valuable for current and future research, and preserve data for the long-run.

DATA REPOSITORIES SOFTWARES LIST

Repository Software	Developer/Origin
Archimede	Laval University Library
Artudis	Erasmus University Rotterdam
DAITSS	Florida Center for Library Automation
Dienst	Cornell Digital Library Research Group
DSpace	DSpace Foundation DuraSpace
Enterprise-Wide Digital Repository and Archive	Sun Microsystems
EPrints	Free Software
ETD-db	Virginia Tech University Libraries
eXtensible Text Framework (XTF)	California Digital Library
Fedora	Fedora Commons DuraSpace
Greenstone	New Zealand Digital Library Project, University of Wankato
Invenio	CERN Integrated Digital Library System
IRPlus	University of Rochester
Islandora	Originally from the University of Prince Edward Island
Keystone Digital Library Suite	Index Data. (No longer actively developed.)
MOAI	Developer unknown
MyCoRe	Collaborative software developed at several German universities
NITRC Resources Registry (NITRC-R)	Promotes software tools, resources, and databases
NITRC Computational Environment (NITRC-CE)	Cloud-based platform with popular neuroimaging software tools
Omeka	Center for History and New Media, George Mason University
OPUS	Developed by a consortium of German university partners
PeerLibrary	UC Berkeley
PubMan	eSciDoc project at the Max Planck Society
WEKO	National Institute of Informatics
Zenodo	CERN; runs on Invenio

Add-on	Description	Year
Fedora Tools	Fedora, also known as Fedora Linux, is a Linux distribution developed by the Fedora Project. It was originally developed in 2003 as a continuation of the Red Hat Linux project.	2003
Fez	Fez is the University of Queensland's (UQ) new digital repository management and workflow system. It is Fedora-based and provides easy access to electronic content.	
MOAI	MOAI is a platform for aggregating content from different sources, and publishing it through the Open Archive Initiatives protocol for metadata harvesting.	2013
Muradora	Muradora is a repository application that supports federated identity through Shibboleth authentication and flexible authorization using XACML.	2007
DSpace-CRIS	DSpace-CRIS is the first free open-source extension of DSpace for the Research Data and Information Management ever developed.	2009
SWORD (Simple Web-Service Offering Repository Deposit)	SWORD, which stands for Simple Web service Offering Repository Deposit, was first developed in 2007 by a consortium of UK institutional repository experts.	2007

DSPACE

Overview: DSpace is an open-source repository software package primarily designed for creating open access repositories catering to scholarly and/or published digital content. It serves as a digital archives system, focusing on long-term storage, access, and preservation of digital assets. The optional DSpace registry catalogues nearly three thousand repositories worldwide.

History:

- November 2002: The first public version of DSpace was released through a collaboration between developers from MIT and HP Labs.
- March 2004: The inaugural user group meeting led to the formation of the DSpace Federation by interested institutions.
- July 2007: HP and MIT jointly established the DSpace Foundation to provide leadership and support to the growing DSpace user community.
- May 2009: The DSpace Foundation merged with the Fedora Commons organization to form DuraSpace, pursuing a common mission in a not-for-profit capacity.
- July 2019: DuraSpace merged with LYRASIS, providing ongoing leadership and guidance to the DSpace software and user community.

Technology:

- DSpace is built using Java web applications, numerous programs, and an associated metadata store.
- Web applications facilitate administration, deposit, ingest, search, and access functionalities.
- The asset store is managed on a file system or similar storage system, while metadata, including access and configuration information, is stored in a relational database supporting PostgreSQL and Oracle database systems.
- DSpace primarily offers access through a web interface, with newer versions supporting faceted search and browse capabilities using Apache Solr.

Features:

- Free open-source software with high customizability to meet user needs.
- Capable of managing and preserving various digital content formats, including PDFs, Word documents, JPEGs, MPEGs, and TIFF files.

- Utilizes Apache Solr-based search for metadata and full-text content, supporting UTF-8.
- Available in 22 languages with granular group-based access control and optimization for Google Scholar indexing.
- Integration with various platforms such as BASE, CORE, OpenAIRE, Unpaywall, and WorldCat.

Supported Operating Systems: DSpace software is compatible with Linux, Solaris, Unix, Ubuntu, Windows, and can be installed on OS X, with Linux being the most commonly used OS.

Notable DSpace Repositories:

- The World Bank - Open Knowledge Repository
- Apollo - University of Cambridge Repository
- Digital Access to Scholarship at Harvard
- DSpace@MIT
- Spiral - Imperial College London Repository
- WHO Institutional Repository for Information Sharing

A comprehensive list of institutional repositories utilizing DSpace software is available via the Registry of Open Access Repositories (ROAR) and the DuraSpace Registry.

Attribute	Details
Original author(s)	**MIT and HP Labs**
Developer(s)	**DuraSpace (parent company: Lyrasis)**
Initial release	**November 2002**
Stable release	**7.6.1 / 15 November 2023; 3 months ago**
Repository	**GitHub Repository**
Written in	**Java**
Type	**Institutional repository software**
License	**BSD license**
Website	**DuraSpace DSpace**

EPRINTS

Overview: EPrints is a free and open-source software package designed for building open access repositories compliant with the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). It is primarily utilized for institutional repositories and scientific journals, sharing features commonly found in document management systems.

History:

- **Creation:** EPrints was developed in 2000 as a direct outcome of the 1999 Santa Fe meeting, which initiated what later became the OAI-PMH.
- **Reception:** It was warmly received and became one of the first and most widely used free open access institutional repository software, inspiring the development of similar software like DSpace.
- **Version 3 Release:** Version 3 was officially launched on January 24, 2007, during the Open Repositories 2007 Conference. It marked a significant advancement in functionality, providing greater control and flexibility to repository stakeholders.

Technology:

- **Architecture:** EPrints is a Web and command-line application based on the LAMP architecture, although it is written in Perl instead of PHP.
- **Compatibility:** It has been successfully deployed on Linux, Solaris, Mac OS X, and a version for Microsoft Windows was released in May 2010.
- **Plugin Architecture:** Version 3 introduced a plugin architecture for importing and exporting data, converting objects for search engine indexing, and managing user interface widgets.
- **Configuration:** Setting up an EPrints repository involves modifying configuration files written in Perl or XML. The repository's appearance is controlled by HTML templates, CSS stylesheets, and inline images.
- **Localization:** EPrints supports multiple languages through redistributable language-specific XML phrase files, including translations in Bulgarian, French, German, Hungarian, Italian, Japanese, Russian, Spanish, and Ukrainian.

This organized breakdown provides insight into EPrints' development, features, and technological aspects, offering a comprehensive understanding of its functionality and significance in the domain of open access repositories.

Attribute	Details
Developer(s)	University of Southampton
Stable release	3.4.5 / May 25, 2023
Repository	GitHub Repository
Written in	Perl
Operating system	Cross-platform
Type	Institutional repository software
License	GPL-3.0-or-later
Website	eprints.org

Fedora (or Flexible Extensible Digital Object Repository Architecture)

Overview: Fedora, which stands for Flexible Extensible Digital Object Repository Architecture, serves as a digital asset management (DAM) content repository architecture suitable for building institutional repositories, digital archives, and digital library systems. It provides a modular architecture emphasizing interoperability and extensibility for storing, managing, and accessing digital content in the form of digital objects.

History:

- **Origins:** The Fedora Repository open-source software project is supported by the DuraSpace not-for-profit organization and has its roots in the Flexible Extensible Digital Object Repository Architecture (Fedora), initially designed and developed by researchers at Cornell University.
- **Development:** Beginning as a DARPA and National Science Foundation-funded research project at Cornell University's Digital Library Research Group in 1997, Fedora evolved into an open-source software project following experimentation by the University of Virginia and subsequent collaboration with Cornell to establish the Fedora Repository project.
- **Trademark Dispute:** In 2003, a trademark dispute arose when Red Hat, Inc. applied for the name "Fedora" associated with their Linux operating system project. After formal disputes, a co-existence agreement was reached allowing both parties to use the name under specific conditions.

Technology:

- **General-Purpose Management Layer:** Fedora offers a management layer for digital objects based on content models representing data objects or collections, including linkages between datastreams, metadata, system metadata, and behaviors.
- **Access Services:** It supports management client access for object ingest, maintenance, and export, as well as API hooks for customized web-based access services via HTTP or SOAP.
- **Interchangeability:** Fedora supports ingest and export of digital objects in various XML formats, facilitating interchange between Fedora and other applications for digital preservation and archiving.
- **Digital Object Model:** The FEDORA digital object model allows aggregation of metadata and digital content as "datastreams", with associated "behaviors" providing different views or dynamic transformations of object content.
- **Relationships:** Semantic relationships are supported using the Resource Description Framework (RDF), enabling indexing and queries over the entire repository of digital objects.
- **Repository Service:** Based on four main Application Programming Interfaces (APIs) - manage, access, search, and metadata harvesting via OAI-PMH - Fedora offers scalability and flexibility, serving as a core component for various applications and platforms.

Support: The Fedora Project is currently supported by the DuraSpace organization.

Attribute	Details
Developer(s)	Open Source
Initial release	May 16, 2003; 20 years ago
Stable release	6.2.0 / June 3, 2022
Repository	GitHub Repository
Platform	Java
Type	Digital asset management
License	Apache License 2.0
Website	fedora.lyrasis.org

GREENSTONE

Overview: Greenstone is a suite of software tools designed for building and distributing digital library collections on the Internet or CD-ROM. It is open-source, multilingual software, released under the GNU General Public License. Developed by the New Zealand Digital Library Project at the University of Waikato, Greenstone has been created and distributed in collaboration with UNESCO and the Human Info NGO in Belgium.

Awards and Recognition: The developers of Greenstone were honored with the International Federation for Information Processing's 2004 Namur Award for their contributions to raising awareness of the social implications of information technology.

Features:

- **Collection Building:** Greenstone enables the creation of large, searchable collections of digital documents. It offers command-line tools for digital collection building and a graphical interface known as the Greenstone Librarians Interface (GLI) for collection building and metadata assignment.
- **Document Import:** Greenstone supports the import of digital documents in various formats including text, HTML, JPG, TIFF, MP3, PDF, video, and Word, among others. Users can select plugins to facilitate the import process.

- **Conversion:** Documents such as text, PDF, and HTML are converted into the Greenstone Archive Format (GAF), an XML equivalent format.

Development History:

- A project for version 3 of Greenstone was initiated on SourceForge in October 2005.
- In 2010, Greenstone version 2.83 was included, along with the Koha Integrated Library System, in an Ubuntu Live-CD.

STARTING RESEARCH DATA MANAGEMENT SERVICES

The importance of research data management (RDM) has grown significantly in recent years. As research becomes increasingly data-driven, ensuring proper data organization, storage, and accessibility is crucial for reproducibility, transparency, and long-term impact. This is where **starting research data management services** comes into play.

What are RDM services?

RDM services are a set of offerings that support researchers in effectively managing their research data throughout the research lifecycle. These services typically encompass:

- **Data management planning (DMP) assistance:** Guiding researchers through creating DMPs, which outline how they will collect, store, share, and preserve their data.
- **Data storage and preservation solutions:** Providing researchers with secure and reliable storage options for their data, ensuring long-term accessibility and preventing data loss.
- **Data sharing and access guidance:** Assisting researchers in sharing their data responsibly, adhering to ethical considerations and data sharing policies.
- **Data curation and training:** Helping researchers organize, document, and describe their data effectively, making it easier for themselves and others to understand and use.

Examples of RDM services:

- **Workshops and training sessions** on DMP creation, data organization, and data sharing best practices.
- **Consultation services** offering personalized guidance to researchers on specific RDM challenges.
- **Development of online resources** such as guides, templates, and FAQs on RDM practices.
- **Providing access to data repositories** and data management tools for researchers to store and share their data.

How is this related to library science?

Libraries are uniquely positioned to play a central role in establishing and managing RDM services. Librarians possess the necessary skills and expertise in:

- **Information organization and curation:** They can help researchers organize and describe their data effectively, making it discoverable and reusable.
- **Instruction and training:** Librarians excel at providing clear and engaging instruction on RDM practices and tools.
- **Staying updated on best practices:** They keep up-to-date with the latest developments in RDM policies, standards, and technologies.

By leveraging these skills, libraries can offer valuable support to researchers, fostering responsible and efficient data management practices. This, in turn, contributes to:

- **Enhanced research quality and reproducibility:** Good RDM practices ensure data integrity and accessibility, facilitating research verification and replication.
- **Increased research transparency and collaboration:** Sharing research data openly allows other researchers to build upon existing findings and fosters collaboration across institutions.
- **Improved research visibility and impact:** Making data accessible increases the potential for wider dissemination and reuse, enhancing the overall impact of research.

Conclusion

Starting research data management services is a strategic investment that benefits both researchers and libraries. By providing essential support for data management throughout the research process, libraries contribute significantly to the quality, transparency, and impact of research endeavors.

PLANNING AND ORGANIZING THE RDM SERVICES

Planning and Organizing RDM Services

The need for well-organized and effective research data management (RDM) services is undeniable. To ensure successful implementation, careful planning and thorough organization are essential. Here's a roadmap to guide you:

1. Needs Assessment:

- **Identify your target audience:** Who will be using these services? Researchers, students, specific disciplines? Understanding their needs and existing research data management practices is crucial.
- **Conduct surveys and focus groups:** Engage with the target audience to gather their specific concerns, preferences, and challenges related to data management.
- **Review existing resources and infrastructure:** Assess if existing resources (e.g., storage facilities, software) can be utilized or need expansion.

2. Develop a RDM Service Strategy:

- **Define service goals and objectives:** What do you aim to achieve? Improved access to data, increased DMP creation, or fostering data sharing practices?
- **Prioritize services based on needs assessment:** Focus on the most critical needs first, considering resource limitations.
- **Develop a service delivery model:** Determine how services will be offered (e.g., workshops, consultations, online resources).

3. Implement and Manage Your Services:

- **Assemble a team:** Identify personnel with relevant skills and knowledge (e.g., librarians, IT specialists).
- **Develop service workflows and protocols:** Set clear guidelines for service delivery, ensuring consistency and quality.
- **Promote awareness and training:** Offer workshops, create online tutorials, and disseminate information through various channels.
- **Monitor and evaluate:** Regularly gather feedback, assess service utilization, and make adjustments as needed to ensure continued effectiveness.

4. Collaboration and Partnerships:

- **Collaborate with other departments:** Partner with research offices, IT services, and graduate schools to integrate RDM services within existing research support structures.
- **Connect with national and international RDM initiatives:** Leverage existing resources and expertise from established organizations in the field.

Remember:

- **Start small and scale gradually:** Build upon your initial offerings based on feedback and evolving needs.
- **Be flexible and adaptable:** Be prepared to modify your approach as technologies, regulations, and user needs evolve.
- **Communicate effectively:** Clearly communicate the benefits and value proposition of RDM services to gain buy-in from stakeholders.

By following these steps and fostering ongoing collaboration, you can establish well-organized and impactful RDM services that empower researchers and enhance your institution's research support capabilities.

Example: Planning and Organizing RDM Services at a University

Scenario: A university library plans to offer RDM services for its research community.

Needs Assessment:

- **Surveys:** Researchers indicate a lack of knowledge about DMPs and data storage options.
- **Focus groups:** Faculty express concerns about data security and regulations regarding data sharing.

RDM Service Strategy:

- **Goals:** Increase DMP creation by 50% within a year and promote adoption of the university's data repository.

- **Priority services:** Offer DMP training workshops and provide consultations on data storage and sharing.
- **Delivery model:** Conduct in-person workshops, host online webinars, and offer individual consultations by appointment.

Implementation and Management:

- **Team:** Librarians with expertise in data management and IT specialists with knowledge of data storage infrastructure.
- **Workflows:** Develop protocols for consultation scheduling, resource creation (e.g., DMP templates), and data repository training.
- **Promotion:** Partner with the research office to promote RDM services through department meetings and university publications.
- **Evaluation:** Track workshop attendance, consultation requests, and data repository usage to assess service effectiveness and identify areas for improvement.

Collaboration:

- **Library collaborates with the research office** to integrate DMP development into the grant proposal process, ensuring early consideration of data management.
- **Librarian attends national RDM conferences** to stay updated on best practices and connect with other professionals for resource sharing and collaboration.

This example illustrates how specific considerations and actions can be taken within the framework of planning and organizing RDM services. Remember, this is just one example, and the specifics will vary depending on your unique context and resources.

PROMOTING THE RDM SERVICES.

Promoting Your RDM Services:

Once you've established your RDM services, the next crucial step is promoting them effectively to your target audience. Here are some strategies to get the word out:

1. Multi-Channel Approach:

- **Develop a website:** Create a dedicated webpage with clear and concise information about your RDM services, including:
  - Service descriptions, benefits & resources
  - Contact information for consultations
  - FAQs and links to relevant guidelines
- **Utilize social media:** Share engaging content about RDM best practices, new services, and success stories on platforms relevant to your audience.
- **Email marketing:** Target researchers and faculty with tailored email campaigns highlighting specific services relevant to their research interests.
- **Traditional methods:** Don't underestimate the power of posters, flyers, and presentations at departmental meetings, conferences, and research fairs.

2. Collaborative Efforts:

- **Partner with research offices:** Collaborate on integrating RDM services into workshops, grant proposal guidance, and researcher onboarding programs.
- **Engage faculty champions:** Identify faculty members who see the value of RDM and encourage them to promote your services to their students and colleagues.
- **Organize workshops and training sessions:** Offer interactive workshops to educate researchers on DMP creation, data sharing best practices, and available RDM tools.

3. Content Marketing:

- **Develop informative blog posts and articles:** Address common RDM challenges and highlight the benefits of good data management practices.

- **Create video tutorials and explainers:** Use short, engaging videos to demonstrate how to use specific RDM tools and resources.
- **Develop case studies and success stories:** Showcase how researchers within your institution have benefited from utilizing your RDM services.

4. Incentives and Recognition:

- **Offer incentives for participation:** Consider offering workshop participants small incentives like refreshments or certificates of completion.
- **Recognize researchers who utilize RDM services:** Highlight success stories in newsletters, publications, or awards to showcase the value of responsible data management.

5. Continuous Evaluation:

- **Monitor website traffic and social media engagement:** Track the reach and impact of your promotional efforts to identify what resonates best with your audience.
- **Gather feedback through surveys and focus groups:** Ask researchers about their awareness of RDM services and gather feedback on the effectiveness of your promotional strategies.

By implementing these strategies, you can effectively promote your RDM services, reach a wider audience, and ultimately encourage responsible and impactful research within your institution. Remember, successful promotion requires a continuous effort, utilizing various channels and adapting based on feedback and evolving needs.

EVALUATING AND REFINING THE RDM SERVICES.

how to effectively evaluate and refine your established RDM services:

1. Define Evaluation Criteria

- **Alignment with goals:** Do your services directly support the goals you outlined during your planning phase?
- **User satisfaction:** Do your services meet researchers' needs and expectations?
- **Service utilization:** Are researchers actively using the services (workshop attendance, consultations, data repository deposits)?
- **Impact on research:** Are you seeing evidence of improved data management practices, increased sharing, and potential reuse?

2. Data Collection Methods

- **User surveys:** Gather detailed feedback on service satisfaction, usefulness, and areas for improvement.
- **Usage statistics:** Track resource usage, consultation frequency, workshop participation, and data repository deposits.
- **Qualitative interviews:** Gain deeper insights into researchers' experiences and challenges with RDM services.
- **Focus groups:** Facilitate discussions with stakeholders to gather diverse perspectives.
- **Review service documentation:** Analyze help desk tickets and consultation notes to identify common questions and recurring issues.

3. Analysis and Refinement

- **Identify strengths and weaknesses:** Analyze the collected data to pinpoint specific areas where services excel and areas requiring improvement.
- **Prioritize refinements:** Focus on addressing the most critical issues impacting service effectiveness.
- **Possible Refinements:**
  - Improve existing resources (update guides, refine DMP templates).
  - Develop new services based on identified needs (e.g., hands-on data curation workshops).
  - Adjust delivery methods based on user preference (e.g., offer more online vs. in-person options).
  - Enhance promotion strategies to target areas with low service adoption.

4. Iterative Evaluation and Communication

- **Regular evaluation cycles:** Set up ongoing evaluation (e.g., annually or biennially) to ensure services continue to meet evolving needs.
- **Open communication:** Communicate any changes or refinements to RDM services clearly and proactively with your user community.

Example: Evaluating RDM Services at a University

A university library identifies an increase in DMP consultations but low usage of their data repository. Evaluation may involve:

- **Surveys:** Researchers indicate hesitancy with sharing data due to a lack of clear university-wide sharing policies.
- **Focus groups:** Discussions reveal a need for more training on how to prepare data for sharing responsibly.
- **Refinement actions:**
  - Library collaborates with the research office to draft clear data sharing policies.
  - New workshops on data preparation for sharing are introduced.

Key Points:

- Evaluation should be an ongoing process to adapt services to changing needs.
- Involve stakeholders in the evaluation process for broader insights.
- Communicate any changes or updates to your services transparently.

WEB TECHNOLOGY AND WEB BASED SERVICES

WEB 2.0 AND 3.0

Source:https://images.app.goo.gl/B6v4XKwg6txFArbNA

Features	Web 2.0	Web 3.0
Information	Dynamic	Portable & Personal
Focus	Community	Individual
Content	Sharing	Curation
Interaction	Web Applications	Smart Applications
Search	Keywords/Tags	Context/Relevance
Metrics	Cost Per Click	User Engagement
Advertising	Interactive	Behavioral
Research	Wikipedia	The Semantic Web
Technologies	Flash/Java/XML	RDF/RDFS/OWL

Source:https://images.app.goo.gl/B6v4XKwg6txFArbNA

Web 2.0: A Systematic Overview

1. Definition:

- Web 2.0 refers to websites that emphasize:
  - **User-generated content:** Users create and share content, not just consume it passively.
  - **Ease of use:** Websites are designed to be user-friendly and accessible to a wide audience.
  - **Participatory culture:** Users can interact and collaborate with each other.
  - **Interoperability:** Websites can work together and exchange data seamlessly.

2. History:

- Coined by Darcy DiNucci in 1999.
- Popularized by Tim O'Reilly and Dale Dougherty at the first Web 2.0 Conference in 2004.
- Not a technical upgrade, but a shift in how the web is used.

3. Key Features:

- **Social media/networking sites:** Facebook, Twitter, etc.
- **Blogs:** Online platforms for sharing personal thoughts and experiences.
- **Wikis:** Collaborative platforms for creating and editing content.
- **Folksonomies:** User-generated tags for categorizing content.
- **Video and image sharing sites:** YouTube, Flickr, etc.
- **Web applications (apps):** Software applications delivered over the internet.
- **Collaborative consumption platforms:** Shared use of resources or services.
- **Mashup applications:** Combining data and functionality from different sources.

4. Controversy:

- Tim Berners-Lee (inventor of the Web) argues the term is jargon.
- He envisioned the Web as collaborative, but emphasizes machine-readable content ("Semantic Web" or Web 3.0).

5. Conclusion:

- Web 2.0 transformed the internet into a more interactive and user-driven platform.
- While the term may be debated, its impact on how we use the internet is undeniable.

Web 2.0 and its Impact on Libraries:

Empowering Users:

- **User-generated content:** Libraries can utilize tools like blogs and wikis to allow users to contribute book reviews, create reading lists, or share local history insights.
- **Social media:** Libraries can connect with users on platforms like Facebook and Twitter for announcements, event promotion, and fostering a sense of community.
- **Collaborative platforms:** Wikis can be used for crowdsourcing local history information or creating subject-specific knowledge bases by patrons and librarians.

Enhanced Outreach and Services:

- **Social media marketing:** Libraries can promote events, workshops, and new acquisitions through targeted social media campaigns.
- **Online resources and tutorials:** Libraries use Web 2.0 tools to offer online tutorials on research skills, database access, or technology workshops.
- **Virtual reference services:** Libraries can offer real-time chat or video conferencing consultations via user-friendly platforms.

Improved User Engagement:

- **Interactive exhibits:** Museums and libraries can use online platforms to create interactive exhibits with user-generated content or augmented reality experiences.
- **Online book clubs and discussion forums:** Libraries can facilitate virtual book clubs and discussion forums to encourage online interaction and community building.
- **User feedback and suggestions:** Libraries can leverage online forms and polls to gather user feedback for improving services and collections.

Overall, Web 2.0 empowers libraries to:

- **Become more user-centric:** Libraries can actively involve users in shaping services and collections.
- **Reach a wider audience:** Libraries can connect with online communities and geographically dispersed users.
- **Increase accessibility:** Web 2.0 resources can provide 24/7 access to information and services, regardless of physical location.
- **Offer personalized experiences:** Libraries can tailor online content and recommendations based on user preferences and interests.

Web 3.0: A Systematic Overview

1. Definition:

- Web 3.0, also known as the **Semantic Web**, is a proposed evolution of the internet that aims to be more **machine-readable** and **understandable**.
- It builds upon the foundation of Web 2.0 by adding a layer of **meaning** to online content, enabling machines to interpret and process information beyond just the surface level.
- Tim Berners-Lee has described the Semantic Web as a component of Web 3.0

2. Key Features:

- **Semantic Web:** Utilizes standards like **RDF**, **OWL**, and **SPARQL** to encode information and relationships between things.
- **Machine Learning and AI:** Aims to leverage **machine learning** and **artificial intelligence** to understand the context and meaning of information.
- **Decentralization:** Explores concepts like **blockchain** technology to create a more **decentralized** and **distributed web** with less reliance on centralized authorities.

3. Challenges:

- **Vastness and complexity of data:** Requires efficient ways to handle and manage the vast amount of existing and future data on the web.
- **Vagueness and ambiguity:** Defining and interpreting the meaning of information in a consistent and unambiguous manner.

- **Inconsistency and contradiction:** Ensuring data accuracy and consistency across different sources and perspectives.
- **Decentralization and trust:** Establishing trust and security mechanisms in a decentralized environment without central control.

4. Standards and Technologies:

- **W3C (World Wide Web Consortium):** Plays a key role in developing and standardizing technologies for the Semantic Web.
- **Semantic Web Stack:** Comprises various technologies like **RDF**, **OWL**, **SPARQL**, and others, enabling machine-readable and interconnected data.

5. Current State and Future:

- Many aspects of Web 3.0 are still under development and ongoing research.
- The concept holds great potential for various applications, including:
  - Improved search engine capabilities
  - Enhanced user experiences with personalized recommendations
  - More intelligent and interconnected web applications
  - Increased automation and collaboration across different systems and platforms

6. Impact on Libraries:

- While the full impact of Web 3.0 on libraries remains to be seen, it has the potential to:
  - **Improve information organization and retrieval:** Semantic Web technologies could enable better organization and access to library resources.
  - **Personalize user experience:** Libraries could provide more tailored recommendations and services based on user preferences and needs.
  - **Facilitate data sharing and collaboration:** Enable libraries to share information and resources more efficiently with other institutions.

Overall, Web 3.0 represents a potential leap forward in terms of how information is represented, understood, and utilized on the internet. Libraries can play a crucial role in contributing to the development and adoption of these technologies, leading to a more intelligent and connected information ecosystem.

Library 2.0- Concept, Characteristics, Components

Library 2.0 - Concept, Characteristics, Components:

Library 2.0 is a proposed concept for library services that embrace the principles and technologies of Web 2.0, facilitating user contributions and interactivity. Coined by Michael Casey in 2006, Library 2.0 marks a shift towards user-centered change and interaction within library environments, leveraging the participatory nature of the internet.

Characteristics:

Library 2.0 signifies a strategic shift within libraries, incorporating elements of Web 2.0 into both technological and non-technological services. It emphasizes constant adaptation to meet evolving user needs and fosters a participatory role for library patrons. Major developments in the Library 2.0 era, spanning roughly from 2005 to 2010, saw libraries harnessing internet technologies to provide digital services such as Online Public Access Catalog (OPAC), social networking, wikis, and podcasts, thereby enhancing interactivity and collaboration.

Components:

1. **User-Centered Approach:** Library 2.0 encourages libraries to engage users in the design and implementation of services, allowing for customization and modification based on user feedback.
2. **Continuous Evaluation and Improvement:** Services are regularly evaluated and updated to align with changing user preferences and technological advancements. Libraries prioritize agility, replacing outdated services with newer and more effective ones.
3. **Active User Participation:** Library 2.0 fosters an empowered library user who plays a significant role in co-creating, building, and consulting on library services. This bidirectional flow of information and ideas between users and libraries facilitates rapid evolution and improvement of services.

- **Targeted Digital Services:** By embracing digital platforms, libraries can reach a wider audience, including those who may not have previously utilized library services, thus expanding their impact and relevance.

Key Principles:

- **Interactivity:** Libraries embrace social web technologies to foster interaction between users and library resources.
- **User Participation:** Users are actively involved in shaping library services.
- **Embrace Web 2.0 Technologies:** Libraries harness the power of Web 2.0 tools and applications to enhance service delivery.
- **Continuous Improvement:** Libraries continuously evaluate and improve services based on user feedback and technological advancements.
- **Adaptability:** Libraries remain adaptable, willing to replace outdated services with newer, more effective ones.

Concerns and Considerations:

- **Access to Technology:** Concerns arise regarding equitable access to technology among library patrons.
- **Privacy and Security:** Libraries must address privacy concerns, particularly regarding user-generated content.
- **Hate Speech and Cyberbullying:** Libraries must define and address hate speech within user-generated content policies.
- **Dependency on External Platforms:** Libraries may face challenges, such as reliance on external platforms like Facebook, impacting service delivery.

Online Public Access Catalog (OPAC):

OPAC serves as a gateway to library collections, allowing users to search and access resources online. In Library 2.0, OPACs are transformed into full-featured platforms that improve with user interaction. Librarians work to enhance OPAC usability, customization, and interactivity, incorporating features such as personalized recommendations and user-generated content.

Artificial Intelligence and Participatory Library:

Innovations like Xiaotu in China exemplify the integration of artificial intelligence into library services, enabling real-time virtual reference assistance and personalized interactions. Xiaotu's self-learning functionality and integration with social networks enhance accessibility and engagement for users.

Debate:

Library 2.0 has sparked debates within the librarian community, with discussions around the novelty of its principles and practical implementation strategies. While some argue that Library 2.0 builds upon longstanding service philosophies, proponents highlight its transformative impact facilitated by the convergence of Web 2.0 technologies. Additionally, the concept of Library 4.0 expands upon Library 2.0, incorporating emerging technologies like makerspaces, augmented reality, and big data to further enhance library services and experiences.

INSTANT MESSAGING, RSS FEEDS, PODCASTS, VODCASTS ETC

Library 2.0 Components and their Benefits in Libraries:

1. Instant Messaging (IM):

- **Example:** A student needs help finding information for a research paper. They can use IM to chat directly with a librarian in real-time, getting personalized assistance without leaving their dorm room.
- **Benefits:** Provides on-demand reference support, improves accessibility for remote users, and allows for quick and convenient communication.

2. RSS Feeds:

- **Example:** A library blog publishes new book reviews and upcoming events. Patrons can subscribe to the library's RSS feed and receive updates directly on their computers or mobile devices, staying informed about library offerings.
- **Benefits:** Allows users to easily stay updated on new library resources and events, promotes library services to a wider audience, and facilitates targeted information dissemination.

3. Podcasts:

- **Example:** A library creates a podcast series featuring local authors discussing their work. Patrons can listen to these podcasts while commuting, exercising, or completing chores, making library resources accessible during their daily routines.
- **Benefits:** Offers engaging and convenient access to educational content, promotes local authors and literary initiatives, and expands the reach of library educational resources beyond physical space.

4. Vodcasts:

- **Example:** A librarian creates video tutorials demonstrating how to use the library's online databases or research tools. Patrons can access these vodcasts at their own pace, rewatching them as needed, to learn and improve their information literacy skills.
- **Benefits:** Provides on-demand learning opportunities, caters to different learning styles (visual), and offers flexible access to instructional materials outside of library hours.

WEB – SCALE DISCOVERY SERVICE

Web-Scale Discovery Services and their Benefits in Libraries:

Concept:

Web-scale discovery services are online search tools that **aggregate information from various library resources** and **present them in a single, user-friendly interface**. They aim to provide a **Google-like search experience** for library users, allowing them to search across a vast collection of materials with a single query.

Benefits:

- **Improved User Experience:**
  - **One-stop search:** Users can search across multiple library resources (books, journals, databases, etc.) without navigating different interfaces.
  - **Relevance ranking:** Results are ranked by relevance, helping users find the most relevant information quickly.
  - **Faceted search:** Allows users to refine their search based on various criteria, like publication date, author, or subject.
- **Enhanced Resource Discovery:**
  - **Uncovers hidden resources:** Users can discover resources they might not have known existed, leading to a wider range of information accessibility.
  - **Full-text searching:** Enables searching within the full text of articles and ebooks, not just titles and abstracts.
  - **Interoperability:** Integrates with other library systems, like the library catalog, for seamless information access.
- **Increased Accessibility:**
  - **Remote access:** Users can access the library's resources from anywhere with an internet connection, improving accessibility for those who cannot visit the library physically.
  - **Mobile-friendly interfaces:** Many discovery services offer mobile-friendly interfaces, making it easy for users to search on the go using their smartphones or tablets.
  - **Multilingual support:** Some services offer support for multiple languages, catering to diverse user communities.

Examples:

- **EBSCO Discovery Service:** Provides access to a vast collection of scholarly journals, ebooks, and other academic resources.
- **ProQuest Discovery Service:** Offers a comprehensive search platform for academic and popular content, including journals, ebooks, newspapers, and dissertations.
- **OCLC WorldCat Discovery:** Connects users to library collections worldwide, allowing them to search for and request materials from other libraries.

Overall, Web-scale discovery services play a crucial role in transforming libraries into dynamic hubs for information

discovery. By offering a user-friendly and comprehensive search experience, these services empower users to access a wealth of information, regardless of location or physical library access.

Type	Product	Vendor
Commercial	Summon	Serial Solutions
Commercial	Primo Central	ExLibris
Commercial	EBSCO Discovery Service	EBSCO
Commercial	WorldCat Discovery	OCLC
Open-source	Blacklight	Independent
Open-source	VuFind	Villanova University Library
Open-source	Lukida	GBV Common Library Network
Open-source	Aspen Discovery	ByWater Solutions

MOBILE BASED LIBRARY SERVICES

Mobile-Based Library Services and their Benefits:

Concept:

Mobile-based library services leverage **mobile technology** (smartphones and tablets) to provide library resources and functionalities **conveniently and accessible anytime, anywhere**.

Benefits:

- **Enhanced Accessibility:**
  - **24/7 access:** Users can access the library's resources and services outside of library hours, removing limitations imposed by physical location and opening times.
  - **Location independence:** Users can access the library from anywhere with an internet connection, whether at home, traveling, or on the go.
  - **Bridging the digital divide:** Mobile access can be beneficial for users in underserved communities who may not have access to a computer or internet at home.
- **Improved User Experience:**
  - **Convenience:** Users can access their library accounts, renew books, search the catalog, and even place holds on materials, all from their mobile devices.
  - **Personalized experience:** Some apps offer personalized features like recommendations based on user preferences, reading history, and trending items.
  - **Seamless integration:** Mobile apps can integrate with other library services and resources, creating a unified and user-friendly experience.
- **Increased Engagement:**
  - **Notifications:** Libraries can send users notifications about upcoming events, new arrivals, and personalized recommendations, fostering engagement and awareness.
  - **Interactive features:** Mobile apps can incorporate interactive features like digital book clubs, discussion forums, and polls, promoting user engagement and community building.
  - **Location-based services:** Libraries can offer location-based services, like displaying nearby library branches or historical landmarks, enriching user experience.

Examples:

- **Library Catalog Apps:** Allow users to search the library catalog, view their account details, and renew borrowed materials.

- **E-book and Audiobook Apps:** Provide access to a vast collection of ebooks and audiobooks for reading and listening on the go.
- **Mobile Research Guides:** Offer curated resources and research tools on specific topics, assisting users in their research endeavors.
- **Library Event Apps:** Allow users to browse upcoming events, register for programs, and receive notifications about changes or cancellations.

Overall, Mobile-based library services are transforming the way users interact with libraries, providing a convenient, accessible, and engaging experience. By embracing these technologies, libraries can reach a wider audience, empower users with on-demand access to information, and evolve into dynamic hubs of knowledge and community connection in the mobile age.

Tools – Library Apps, Mobile Library Instructions, SMS Alerts, Geo-Location, Reference Enquiry.

The rise of mobile technology has revolutionized library services, offering users convenient and accessible tools right in their pockets. Here's a breakdown of some key mobile-based library services and their benefits:

1. Library Apps:

- **Function:** Provide a one-stop shop for accessing various library resources and functionalities.
- **Benefits:**
  - **Search and manage library accounts:** Users can search the catalog, view their borrowing history, renew materials, and place holds, all within the app.
  - **Access e-resources:** Many apps offer access to ebooks, audiobooks, and digital magazines for reading and listening on the go.
  - **Receive personalized recommendations:** Some apps provide recommendations based on user preferences and reading history, promoting user engagement.

2. Mobile Library Instructions:

- **Function:** Offer step-by-step guides and tutorials on using library resources and services.
- **Benefits:**
  - **Improved accessibility:** Users can learn how to use the library's resources and services at their own pace, regardless of location.
  - **Reduced learning curve:** Clear instructions can simplify the library experience for new users or those unfamiliar with specific tools.
  - **Increased self-reliance:** Empowering users to navigate the library independently fosters a sense of self-sufficiency.

3. SMS Alerts:

- **Function:** Send users text messages with notifications and reminders.
- **Benefits:**
  - **Timely updates:** Users can receive notifications about due dates, hold pickups, library events, and service updates.
  - **Convenient reminders:** SMS alerts help prevent overdue fines and ensure users are aware of important information.
  - **Accessible communication channel:** Text messages ensure communication reaches users, even if they don't have internet access.

4. Geo-Location:

- **Function:** Utilize GPS technology to provide location-based services.
- **Benefits:**
  - **Find nearby libraries:** Users can easily locate the nearest library branch and get directions.

- **Discover library resources in their area:** Users can find nearby historical landmarks, museums, or partner libraries with relevant resources.
- **Enhance accessibility:** Geo-location services improve access to library services for users with physical limitations.

5. Reference Enquiry:

- **Function:** Allow users to submit reference questions directly from their mobile devices.
- **Benefits:**
  - **Convenient access to librarians:** Users can get answers to their questions quickly and easily, regardless of library hours or location.
  - **Multiple channels for assistance:** Users can choose their preferred method of communication, such as text chat or phone call.
  - **Reduced wait times:** This can be helpful for simple questions or situations where visiting the library in person is not feasible.

Social Web Networks and Content Management Systems.

Social Web Networks and Content Management Systems

Social web networks and content management systems (CMS) are two distinct technologies that can be surprisingly intertwined when it comes to information sharing and online communities. Here's a breakdown of their individual functions and how they can complement each other:

1. Social Web Networks:

- **Function:** Platforms enabling users to connect, share information, and build communities online.
- **Examples:** Facebook, Twitter, Instagram, YouTube.
- **Key Features:**
  - **User profiles:** Individual pages showcasing personal information, interests, and connections.
  - **Content sharing:** Posting text, images, videos, and other multimedia content.
  - **Social interaction:** Liking, commenting, sharing, and following other users and content.
  - **Community building:** Creating groups or forums around shared interests.

2. Content Management Systems (CMS):

- **Function:** Platforms for creating, managing, and publishing website content.
- **Examples:** WordPress, Wix, Squarespace, Drupal.
- **Key Features:**
  - **User-friendly interface:** Enables users to create and edit content without needing coding knowledge.
  - **Content organization:** Categorizing and structuring content for easy navigation.
  - **Publishing tools:** Scheduling content publication and managing different versions.
  - **User management:** Controlling access levels and permissions for different users.

Connecting the Dots:

While their primary functions differ, social web networks and CMS can work together in several ways:

- **Content Promotion:**
  - Organizations using a CMS can leverage social media platforms to promote their content, reaching a wider audience and driving traffic to their website.
  - Sharing blog posts, articles, or videos on social media can spark conversation and engagement around the content.
- **Community Building:**
  - Social media can be used to build communities around specific topics or interests that align with the content on a website managed by a CMS.

  - Groups, forums, and discussions on social media can foster deeper engagement with the content and create a sense of belonging.
- **User-Generated Content:**
  - Social media platforms can be a source of user-generated content that can be integrated into a website managed by a CMS.
  - Reviews, testimonials, or user-created content can add value and authenticity to the website's content.
- **Social Login:**
  - Some CMS platforms allow users to log in using their social media credentials, simplifying the registration process and potentially increasing user engagement.

Overall, social web networks and content management systems, while serving distinct purposes, offer complementary functionalities. By leveraging their strengths and fostering their interaction, organizations can enhance content promotion, build thriving communities, and create a more dynamic online presence.

COLLABORATIVE SERVICES SOCIAL NETWORKS, SOCIAL TAGGING

Collaborative Services: Social Networks and Social Tagging

Collaborative services encompass various online tools and platforms that enable users to **work together, share information, and contribute to a common goal**. Two key elements within this category are **social networks** and **social tagging**:

1. Social Networks:

- **Function:** Platforms enabling users to connect, share information, and build communities online.
- **Examples:** Facebook, Twitter, LinkedIn, Reddit.
- **Collaborative features:**
  - **Group creation and discussion:** Users can form groups around shared interests, projects, or goals, allowing them to share ideas, resources, and collaborate on tasks.
  - **Document sharing and co-editing:** Platforms like Google Docs and Microsoft OneDrive allow real-time co-creation and editing of documents, facilitating collaborative writing and project management.
  - **Knowledge sharing and discussion forums:** Users can share knowledge, ask questions, and discuss topics within groups or specific communities, fostering collaborative learning and problem-solving.

2. Social Tagging:

- **Function:** Assigning user-generated keywords (tags) to categorize and describe online content, such as articles, images, or videos.
- **Examples:** Flickr, Delicious, YouTube.
- **Collaborative aspects:**
  - **Collective organization:** Tags are added by multiple users, creating a shared understanding and organization of information.
  - **Discovery and exploration:** Users can find relevant content based on popular or relevant tags, fostering serendipitous discovery and exploration of information.
  - **Collaborative knowledge creation:** Tags can act as a collective knowledge base, reflecting the collective understanding and interpretation of information within a community.

Synergy of Social Networks and Social Tagging:

Social networks and social tagging often work hand-in-hand within collaborative services:

- **Social networks can facilitate social tagging:** Groups and communities on social media platforms can encourage users to collaboratively tag content relevant to their shared interests, enhancing discoverability and fostering knowledge sharing within the community.
- **Social tagging can enrich social networks:** Tags can be used to categorize discussions, shared resources, and group content within social networks, making it easier for users to find relevant information and participate meaningfully in conversations.

Benefits of Collaborative Services:

- **Enhanced knowledge sharing and collective learning.**
- **Improved information discovery and organization.**
- **Facilitated collaboration and teamwork.**
- **Empowerment of users to contribute and participate.**

Overall, social networks and social tagging, as key components of collaborative services, empower users to work together, share knowledge, and create a collective understanding of information in the digital world.

CONTENT MANAGEMENT SYSTEMS.

Content Management Systems (CMS)

Content management systems (CMS) are software applications that simplify the creation, management, and publication of website content. They provide user-friendly interfaces, allowing individuals with no coding experience to easily build and maintain dynamic websites. Here's an overview of CMS and some popular examples:

What are CMS used for?

- **Creating and editing website content:** From blog posts and articles to product descriptions and landing pages, CMS allows users to create and edit content visually without needing to write code.
- **Organizing website structure:** CMS helps categorize content into pages, menus, and sections, making website navigation easier for both visitors and administrators.
- **Publishing and scheduling content:** Users can schedule content publication for specific dates and times, streamlining website updates and content management.
- **User management:** Granting different levels of access and permissions to users ensures website security and content control.
- **Integration with other tools:** Many CMS offer plugins and integrations with various applications, expanding functionalities like e-commerce, analytics, and marketing automation.

Popular CMS Examples:

- **WordPress:** Open-source, user-friendly platform with a vast community and plugin ecosystem, making it popular for blogs, personal websites, and even complex business websites.
- **Wix:** Cloud-based platform with drag-and-drop website builder and built-in marketing and SEO tools, catering to beginners and small businesses.
- **Squarespace:** All-in-one solution with website hosting, domain registration, and design templates, ideal for creating professional-looking websites.
- **Drupal:** Open-source and highly customizable platform known for its flexibility and scalability, suitable for complex websites and large organizations.
- **Joomla:** Open-source platform offering powerful features and extensibility through plugins and templates, popular for content-heavy websites and community portals.

Choosing the right CMS depends on your specific needs and technical expertise. Consider factors like:

- **Ease of use:** How easy is it to navigate the platform and create content?
- **Features and functionality:** Does the CMS offer the features you need, like e-commerce capabilities or multilingual support?
- **Scalability:** Will the platform be able to grow with your website's needs?
- **Cost:** Is the CMS open-source and free, or does it require a paid subscription?

POPULAR CONTENT MANAGEMENT SYSTEMS

Name	Web Content Management	Group Content Management	Enterprise Content Management	Notes
WordPress.com	Yes	Yes	No	Free and user-friendly, good for small businesses and blogs.
HubSpot CMS Hub	Yes	Yes	Yes	All-in-one marketing platform with CMS capabilities.
Wix	Yes	Limited	No	Easy-to-use website builder with limited content management features.
Squarespace	Yes	Limited	No	Website builder with beautiful templates, good for small businesses and portfolios.
Contentful	Yes	Yes	Yes	Flexible headless CMS for building custom content experiences.
Webflow	Yes	Yes	No	Drag-and-drop website builder with powerful design capabilities.
Microsoft 365	Yes	Yes	Yes	Includes various tools for content management, collaboration, and communication. (SharePoint Online)

RESEARCH INFORMATION MANAGEMENT SYSTEM

Research Information Management Systems (RIMS)

What are Research Information Management Systems (RIMS)?

RIMS are software applications designed to **facilitate the efficient and centralized management of research information** within institutions, universities, and research organizations. They act as a digital hub, integrating and streamlining various aspects of the research lifecycle, from proposal development to publication and impact analysis.

Benefits of RIMS:

- **Improved research efficiency:** RIMS streamline workflows, centralize information, and automate repetitive tasks, allowing researchers to focus on their research endeavors.
- **Enhanced collaboration:** RIMS facilitate collaboration among researchers by sharing research data, publications, and project information.
- **Increased research visibility:** RIMS can improve the visibility of research outputs by managing publications, maintaining researcher profiles, and promoting online discoverability.
- **Streamlined research reporting:** RIMS simplify the process of collecting, analyzing, and reporting research data for internal or external purposes.
- **Improved decision-making:** RIMS provide valuable data and insights that can assist research administrators and leaders in making informed decisions about resource allocation, funding, and future research directions.

Key functionalities of RIMS:

- **Researcher profiles:** Create and manage profiles showcasing researchers' expertise, publications, and contributions.
- **Proposal management:** Develop, track, and submit research proposals electronically, improving efficiency and compliance.
- **Publication management:** Submit and track publications, maintain bibliographic information, and integrate with external databases.
- **Grant management:** Manage funding applications, track awards, and report on grant activity.
- **Peer review management:** Streamline the peer review process for research proposals and manuscripts.
- **Data management:** Store, organize, and share research data securely, facilitating data analysis and collaboration.

- **Metrics and analytics:** Provide insights into research output, impact, and trends, informing decision-making and future research strategies.

Examples of RIMS software:

- **Elsevier Pure:** A widely used RIMS known for its comprehensive functionalities and integration with other Elsevier products.
- **Figshare:** A cloud-based platform focusing on research data management and collaboration.
- **OpenAIRE:** An open-source RIMS designed to promote open access and facilitate research data sharing.
- **Symplectic Elements:** A comprehensive RIMS offering a suite of tools for managing various aspects of the research lifecycle.

Overall, RIMS are becoming increasingly important tools for researchers, research teams, and institutions to optimize research workflows, enhance collaboration, and maximize the impact of their research endeavors.

LIST OF RESEARCH INFORMATION MANAGEMENT SYSTEM

Product	Developer	Latest version	Open source	Software license	Interface	Written in
ADaMSoft	Marco Scarno	27 April 2015	Yes	GNU GPL	CLI, GUI	Java
Alteryx	Alteryx Inc.	2019.2 (June 2019)	No	Proprietary	GUI, Python SDK, js SDK	C#, C++, Python, R, js
Analyse-it	Analyse-it		No	Proprietary	GUI	C#, C++, Fortran
ASReml	VSN International	26 March 2014	No	Proprietary	CLI	
BMDP	Statistical Solutions		No	Proprietary		
Dataplot	Alan Heckert	2013	Yes	Public domain	CLI, GUI	Fortran
GAUSS	Aptech Systems	2020	No	Proprietary	CLI, GUI	C, C++
GraphPad Prism	GraphPad Software, Inc.	February 2009	No	Proprietary	GUI	
JMP	SAS Institute	16.1 (July 2021)	No	Proprietary	GUI, CLI	
LIMDEP	Econometric Software, Inc., William Greene	May 2012	No	Proprietary	CLI, GUI	Fortran, C++
Maple	Maplesoft	2023 (9 March 2023)	No	Proprietary	CLI, GUI	
MATLAB	MathWorks	R2020b (17 September 2020)	No	Proprietary	CLI, GUI	C++, Java, MATLAB
MaxStat Pro	MaxStat Software	Pro 3.6	No	Proprietary	GUI	VB.net, C++, C#
MedCalc	MedCalc Software Ltd	22 (12 May 2023)	No	Proprietary	GUI	
Minitab	Minitab, LLC	14 April 2021	No	Proprietary	CLI, GUI	

NCSS	NCSS, LLC	February 2015	No	Proprietary	GUI	
NLOGIT	Econometric Software, Inc., William Greene	May 2012	No	Proprietary	CLI, GUI	Fortran, C++
OpenEpi	A. Dean, K. Sullivan, M. Soe	22 September 2014	Yes	GNU GPL	GUI	JavaScript, HTML
Orange	Bioinformatics Laboratory, Faculty of Computer and Information Science, University of Ljubljana	10 January 2016	Yes	GNU GPL	GUI/Python	Python, Cython
Origin	OriginLab	3.23.0 (5 September 2019)	No	Proprietary	GUI	C++
Ox programming language	OxMetrics, J.A. Doornik	August 2011	No	Proprietary	CLI	
OxMetrics	OxMetrics, J.A. Doornik	August 2011	No	Proprietary	CLI, GUI	
Primer	PRIMER-e	January 2015	No	Proprietary	GUI	
PSPP	GNU Project	1.6.2 (2 July 2022)	Yes	GNU GPL	CLI, GUI	C
R	R Foundation	4.3.2 (31 October 2023)	Yes	GNU GPL	CLI, GUI[7]	C, Fortran, R
R++	Zebrys	1.6.15 (8 December 2023)	No	Proprietary	CLI, GUI	C++ (Qt)
RKWard	RKWard community	0.7.3 (21 April 2022)	Yes	GNU GPL	CLI, GUI	C++, ECMAScript

RESEARCH INFORMATION MANAGEMENT TOOLS

Research Information Management Tools: Equipping Researchers for Success

Research Information Management (RIM) tools are a broader category encompassing various software applications and online resources specifically designed to **support researchers** throughout the research lifecycle. While **Research Information Management Systems (RIMS)** as mentioned earlier, are integrated software platforms, RIM tools can be individual applications or services addressing specific needs within the research process.

Benefits of using RIM tools:

- **Improved organization and efficiency:** Researchers can manage research data, publications, citations, and other essential information efficiently, reducing time wasted on manual tasks.
- **Enhanced collaboration and communication:** Tools facilitate sharing information and collaborating with colleagues, reviewers, and funders.
- **Increased research visibility:** Researchers can manage online profiles, showcase their research outputs, and promote their work through various platforms.
- **Streamlined reporting and compliance:** Tools can automate reporting processes and ensure adherence to data management and funding agency requirements.
- **Data analysis and insights:** Some tools offer functionalities to analyze research data, identify trends, and inform future research directions.

Examples of RIM tools:

1. Reference Management Software:

- **Mendeley:** A popular platform for managing references, organizing PDFs, and collaborating with others on research projects.
- **EndNote:** A comprehensive solution with advanced features like citation formatting and manuscript preparation tools.
- **Zotero:** An open-source option offering desktop and browser extensions for reference management and research organization.

2. Research Data Management Platforms:

- **Figshare:** A cloud-based platform for storing, sharing, and discovering research data with customizable access settings.
- **Dryad:** A repository specifically designed for data archiving and sharing in the biological sciences.
- **Dataverse:** An open-source platform offering secure data storage, collaboration tools, and data sharing functionalities.

3. Researcher Profile Management Tools:

- **ORCID**: A non-profit organization offering an open registry for researchers to uniquely identify themselves and showcase their scientific contributions.
- **Google Scholar Profiles:** Researchers can create profiles to manage their publications, track citations, and connect with other scholars.
- **ResearchGate:** A social networking platform for researchers to connect, share research, and collaborate on projects.

4. Online Collaboration Tools:

- **Slack:** A communication platform facilitating team discussions, file sharing, and project management within research groups.
- **Google Drive:** Online storage and collaboration tools allowing researchers to share documents, spreadsheets, and presentations in real-time.
- **Microsoft Teams:** Cloud-based platform offering video conferencing, file sharing, and collaborative workspaces for research teams.

5. Literature Review and Citation Analysis Tools:

- **Scopus:** A citation database facilitating literature searches, identifying relevant research articles, and analyzing citation trends.
- **Web of Science:** Another extensive citation database offering similar functionalities for literature review and citation analysis.
- **Altmetric:** A platform tracking online mentions and social media engagement related to academic publications.

Choosing the right RIM tools depends on individual needs and research areas. Factors to consider include:

- **Specific functionalities**: Identify tools addressing your specific needs, like reference management, data sharing, or researcher profile management.
- **User-friendliness**: Choose tools with intuitive interfaces and features that cater to your technical expertise.
- **Integration**: Consider if the tools integrate with other software or platforms you use for research collaboration.
- **Costs**: Some tools are open-source and free to use, while others offer paid subscriptions with additional features.

By utilizing a combination of various **RIM tools** and comprehensive **RIMS**, researchers can empower themselves with the resources and functionalities needed to streamline their research workflow, enhance collaboration, and ultimately achieve their research goals with greater efficiency and impact.

(IRINS, VIVO)

IRINS and VIVO: Facilitating Scholarly Communication and Collaboration

Both **IRINS** and **VIVO** are web-based Research Information Management (RIM) systems, but they cater to different purposes and user groups:

1. IRINS (Information and Library Network (INFLIBNET) Research Information System):

- **Focus:** Primarily serves **Indian academic and research institutions** by providing a platform to:
  - **Collect and curate scholarly communication activities** of faculty members, researchers, and students.
  - **Showcase research outputs** like publications, presentations, and datasets.
  - **Create scholarly network** connections with colleagues and institutions.
- **Target Users:** Primarily focused on **Indian academicians, researchers, and research institutions**.

- **Key Features:**
  - **Institutional repository:** Stores and showcases research outputs of affiliated institutions.
  - **Researcher profiles:** Allows researchers to create and manage their profiles, highlighting achievements and publications.
  - **Collaboration tools:** Enables researchers to connect and collaborate with colleagues within and beyond their institutions.
  - **Open access support:** Promotes open access to research outputs by encouraging deposit in the institutional repository.

2. VIVO (Virtual Institutional Value Object):

- **Focus:** Provides a **flexible framework** for universities and research institutions worldwide to:
  - **Collect and manage diverse research information** including publications, grants, datasets, and expertise.
  - **Connect researchers, their outputs, and activities** for a holistic view of institutional research contributions.
  - **Showcase research expertise** and facilitate collaboration opportunities.
- **Target Users:** Primarily **universities and research institutions** globally.
- **Key Features:**
  - **Flexible data model:** Adapts to the specific needs and information structures of different institutions.
  - **Integration with existing systems:** Integrates with various CRIS (Current Research Information Systems) and other institutional repositories.
  - **Semantic web technologies:** Enables interoperability and knowledge sharing across different research information systems.
  - **Visibility and discoverability:** Enhances the visibility and discoverability of researchers and their research outputs.

In essence, IRINS and VIVO serve complementary purposes within the larger realm of research information management. Choosing the right system depends on the specific needs and context:

- **For Indian institutions:** IRINS offers a readily available and locally focused solution.
- **For institutions seeking a flexible and adaptable platform:** VIVO caters to diverse needs and integrates seamlessly with existing systems.

Ultimately, both IRINS and VIVO play a crucial role in **facilitating scholarly communication, promoting collaboration, and increasing the visibility and impact of research endeavors.**

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